

SAJOUS'S
ANALYTIC CYCLOPEDIA
OF
PRACTICAL MEDICINE

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SUPPLEMENT



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PREFACE

EACH year an ever-increasing number of important contributions emanates from the laboratories and clinics of this country and Europe. It has become impossible for even the most industrious physician to assimilate this vast and diversified medical literature. Indeed, even those whose interest is limited to some particular field have difficulty in keeping abreast of the advances in their special subject. As a consequence, it has been found both necessary and advantageous to publish from time to time a review of the noteworthy advances that have taken place in the various branches of medicine and the medical sciences. In this way only has it been found possible to supply to the medical profession at large a comprehensive survey, in readily available form, of the progress that is taking place in the broad domain of medicine. With this thought in mind, the publication of the present volume has been undertaken.

This volume is based largely upon the world's medical literature for the year 1932, in some instances, papers that were published during the latter months of 1931 have been included. No attempt has been made to furnish a complete survey of the entire medical literature of that period. The aim has been to produce a volume that is a critical review of the outstanding and far-reaching contributions to medicine, surgery, and the medical sciences that have appeared during the past year. The effort has been made to select the subjects reviewed with care and discrimination, having always in mind not only their scientific importance, but also their practical value to practitioners and specialists alike. Experience with former volumes has shown the advantage of arranging the various topics considered alphabetically. This plan has again been followed in the present work. Certain innovations and improvements will be found in this review that were not in the earlier issues. For example, a considerable number of useful illustrations have been incorporated in this volume. Much more extensive use of tables and charts has been made, thus presenting a large amount of important data in a quickly available and easily understandable form. No effort has been spared to make this review more comprehensive, more critical and, at the same time, more generally useful than any of the previous works of this nature that we have undertaken.

It has only been possible to produce a critical review of this kind, covering all phases of medicine, because of the cooperation and interest of a large group of unusually well-qualified contributors selected because of their peculiar fitness to review the special subject in which each has attained prominence. The contributors to this volume number thirty-nine, a definite increase over the number who contributed to earlier issues. This has made it possible to subdivide the various subjects more thoroughly. Moreover, since practically all the contributors to this volume have had considerable experience in this form

of reviewing, they have brought to their work a knowledge and training that have made it possible for them to produce articles that are exceptionally well adapted to the needs of the busy physician

It is a difficult task to attempt to point out the subjects of outstanding importance covered in this review, since there is no subject dealt with that is not of importance and all the topics discussed are of interest. However, there are some subjects that deserve especial mention, either because of recent important advances or because of the extensive literature that has developed about them.

The largest amount of space with propriety has been assigned to internal medicine and its various subdivisions, such as gastroenterology, cardiology, allergic diseases, disturbances of metabolism, diseases of the respiratory tract, endocrinology, parasitology, neurology, etc.

Especial attention should be directed to the excellent contributions on cardiovascular disease, which deal extensively with the newer work on disorders of the peripheral vessels, tests for occlusions and spasm, oscillometry, measurement of surface temperature, the value of foreign protein injections in causing vascular dilatations and improved collateral circulation, and the present status of sympathectomy. Other subjects emphasized include the rheumatic heart, cardiac lues, coronary artery disease and a discussion of the mechanism of pain in angina pectoris, the latest views about primary hypertension and its management, chronic adhesive pericarditis and its relation to multiple serositis and the recent advances in operations on the heart and pericardium.

In few subjects is there more activity than in gastroenterology, the various phases of which are carefully considered in this review. The newer liver function tests, such as those for galactose and lactic acid, are critically considered. Gall-stones, recent studies on the physiology and bacteriology of the biliary tract, jaundice, the always debatable problems of ulcerative colitis, as well as other disturbances of the colon, are all dealt with extensively. The newer conceptions of esophagospasm, gastric physiology, gastritis and duodenitis, in addition to the many important problems in reference to gastric and duodenal ulcer and gastric carcinoma and their treatment, both medical and surgical, are critically discussed.

A great deal of attention has been paid to allergic disorders. In addition to a careful discussion of recent studies on hay fever and asthma, the less well understood subjects of gastrointestinal allergy, physical allergy and allergic migraine are reviewed.

The large amount of work that has been done on metabolic diseases, especially diabetes and obesity, is analyzed with critical care, particular attention being given to their pathogenesis and treatment.

In no field of medicine have advances occurred with such rapidity as in endocrinology. In this volume an effort has been made to furnish a well-balanced discussion of the actual progress that has been made in this subject. The interrelationship of the endocrine glands, the noteworthy researches on the female sex hormones, the newer concept of Addison's disease and its treatment with interrenalin, as well as the present status of disorders of the pituitary and thyroid glands are among some of the subjects reviewed.

Under pulmonary disorders, attention should be directed to the careful discussion of atelectasis and the aerodynamics of bronchial obstruction, and especially to the important recent work on silicosis

Among other topics included under general medicine should be noted the complete review of the anemias, with particular reference to their classification and treatment, the discussion of the blood dyscrasias, including infectious mononucleosis and agranulopenia, the deficiency diseases and the rôle of the ever-increasing number of vitamins in their etiology and treatment, an admirable contribution on pulmonary tuberculosis with a consideration of the most modern methods of treatment, including its surgical aspects, the present conception of the always important subject of syphilis, and the outstanding medical problem of the day, from its experimental as well as practical importance, namely, cancer, with especial reference to its etiology and pathogenesis

In this review the broad field of neuropsychiatry is carefully covered. Among some of the topics dealt with at length may be noted encephalitis, tumors of the brain and the value of cerebrospinal fluid examinations in the differential diagnosis of brain tumors from other conditions, epilepsy, head injuries and their modern management, the various aspects of mental deficiency, the widely discussed subject of poliomyelitis and the several types of meningitis and their treatment

A number of the subjects above referred to have definite surgical aspects that are not neglected. But, in addition, many important subjects of primary surgical interest are reviewed. Anesthesia is emphasized in particular. The newer anesthetics, such as avertin and amytal, are considered in detail. The latest methods of administration are discussed, particular attention being paid to local anesthesia, peridural and controlled spinal anesthesia, and sacral block. Abdominal injuries and their treatment and the latest advances in abdominal surgery in general are extensively dealt with. The surgery of the sympathetic system and other phases of neurosurgery are taken up. Fractures, the various aspects of the subject of hernia, the many problems, both diagnostic and operative, presented by the genitourinary tract, as well as some of the phases of orthopedic surgery, are also discussed.

Obstetrics and gynecology are accorded their full share of prominence. Among the more important subjects discussed in this field are eclampsia and its treatment, dysmenorrhea, ectopic pregnancy, fetal and maternal mortality and their control, ovarian disorders, an unusually comprehensive discussion of parturition and its complications, and pregnancy, with special reference to the newer diagnostic tests.

Throughout the volume an effort has been made to emphasize pediatrics. This is borne out by the excellent review of the anemias of children and the newborn, including Gaucher's disease and sickle cell anemia. Other diseases that are discussed, particularly as they appear in children, are heart disease, convulsions, diabetes, appendicitis, tuberculosis, diarrheal diseases, and the acute infectious diseases, such as diphtheria and scarlet fever.

The more restricted specialties, such as ophthalmology, otolaryngology and dermatology, have been in no sense neglected in this review. The recent

advances in and advantages of endoscopy have been particularly stressed. The latest views in regard to the treatment of eczema, psoriasis and other important skin disorders are taken up. Cataract, diseases of the conjunctiva, retinal changes in various disorders, and lesions of the cornea are some of the topics covered under ophthalmology.

Throughout the entire volume the question of treatment is emphasized. This subject is dealt with in its broadest sense. Not only are the newer drugs discussed, but especially valuable reviews have been prepared on the various aspects of physical therapy. The subject of dietotherapy is taken up in great detail, the whole problem of the acid-base diet is discussed, and special diet lists suitable for certain diseases such as nephritis, obesity, anemia, arthritis and celiac disease have been included.

Although it is impossible to take up all of the subjects of especial interest that are discussed in this volume, mention should be made of the reviews on nephritis, parasitology, clinical pathology and bacteriology, and arthritis.

From the foregoing comments some idea may be obtainable of the broad scope and completeness of this volume which is presented to the medical profession with the hope that it may adequately fulfill its purpose and prove of practical value to those interested in the special fields of medicine, as well as to those who are engaged in general practice.

In conclusion, the editor wishes to express his thanks to Dr. Edward L. Bortz, the assistant editor, who planned this work with such vision, was so largely responsible for its successful completion and also contributed to it extensively. He is also deeply indebted to the contributors for their hearty cooperation and unfailing interest. His thanks again are due Miss L. I. Weisgerber for the complete and excellent index which she has prepared and her constant help in many ways. He is also under obligations to Dr. J. Warren Hundley for his assistance in reading the proof. The publishers are to be congratulated upon the appearance of the volume which they have produced.

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SAJOUS'S ANALYTIC CYCLOPEDIA of PRACTICAL MEDICINE

SUPPLEMENT

A

ABDOMINAL INJURIES.—A clinical study of *subcutaneous injuries* of the abdominal organs, exclusive of contusions and hematmata of the abdominal wall and later appearing herniæ, has been made by J Jaki (Deutsche Ztschr f Chir 232 724, 1931) The author saw 31 such injuries in 9 years of hospital practice and pays particular attention to injuries produced by dull force A classification of injuries follows

Three stages of subcutaneous abdominal injuries are differentiated (1) a stage of shock, (2) a stage of often very transient, subjective improvement, and (3) a stage of collapse following hemorrhage or of peritonitis following injury of the hollow viscera The shock usually develops immediately after the injury and is caused by the mechanical effect produced as the result of a circulatory disturbance in the automatic centers of the medulla oblongata by irritation of

Injured Organ	Kick	Blow from Heavy Object	Body striking against Dull Object	Wheel Injury	Fall and Wheel Injury	Fall	Total
Abdominal wall	1						1
Intestine . . .	10	4	1		1		16
Liver . . .	1			2			3
Spleen			1			2	3
Kidneys . . .	3		2		1	1	7
Bladder	1					.	1

Next to the general symptoms, the cause of a subcutaneous injury of the abdominal organs is of the greatest importance There is hardly any mechanical insult which has not at some time produced a subcutaneous injury of the abdominal viscera, however slight it may be Such injuries are most common in working men of middle age The cause is often uncertain but may be suggested by the history and the objective findings

the subserous endings of the vagus and splanchnic nerves and the sensory spinal nerve endings in the abdominal wall It usually lasts for 1, 2, or 3 hours If it persists longer, it is a sign that the irritation of the subserous nerve endings has become permanent If the injured person is brought for treatment immediately, a decision can be made after 3 hours as to whether the injury is a contusion or a subcutaneous abdominal

injury Operation is indicated in the state of shock if the condition appears to be becoming worse

Of the *general symptoms*, the pulse rate and temperature are of most importance Bradycardia is observed with liver injury Determinations of the blood-pressure and the amount of hemoglobin in the blood are of diagnostic aid

The *local symptoms* are more important than the general symptoms Early and spreading dulness in the lower half of the abdomen, or the cul-de-sac of Douglas is a sure sign of hemorrhage In gastrointestinal perforation none or only a very little of the contents escapes into the abdominal cavity Therefore, the demonstration of free fluid is impossible or very difficult It should be borne in mind that the fatty great omentum produces dulness over every contracted or lengthened portion of the intestines Disappearance or diminution of liver dulness is considered a sure sign of gastrointestinal perforation Early meteorism does not indicate severe injury It is produced by irritation of the retroperitoneal nerve plexus and, therefore, is observed also with fractures of the vertebral column and retroperitoneal hematomata *The most important local symptom is muscular rigidity* This originates in a reflex way as the result of traumatic and chemical irritation of the parietal peritoneum, which contains many nerves It develops only when the stimulus affects the anterior portion of the parietal peritoneum The administration of morphine, which relieves the protective tension without abdominal injury, is contraindicated The old rule that morphine should not be given before diagnosis is established is still valid The occurrence of vomiting 2 or 3 hours after the ac-

cident is not characteristic of an internal injury even when the vomitus is mixed with bile, as it occurs also in simple contusion If vomiting begins after 3 hours and recurs, it is an important sign of spreading peritonitis

In 16 cases of *gastrointestinal injuries*, perforating subcutaneous injuries were found In 13 cases the ileum, and in 3 the jejunum, was affected The injury was single in 14 cases and multiple in 2 In 3 cases the mesentery was also injured In every case the injury was produced by a dull object In 10 it was caused by the kick of a hoof, in 4, by a blow with a dull object, in 1, by striking against a dull object, and in 1, by a fall and compression (wheel) injury. In half of the cases there was an inguinal hernia In the presence of hernia, the increased intraabdominal pressure may lead to rupture of the intestine without any external force According to Bunge, the intestine is forced into the hernial sac, the external wall of the sac bulges, and when the limit of elasticity is passed, the sac bursts

Retroperitoneal injuries of the duodenum at first are usually asymptomatic The subsequent retroperitoneal phlegmon may be palpated as a deep resistance in the right side of the epigastrium Phlegmons which have perforated into the abdominal cavity have an unfavorable prognosis. For a *small perforation*, suture is sufficient, but for a *larger* one resection must be undertaken. In injury of the duodenum *gastroenterostomy* should be done to relieve the suture.

In injuries of the *large intestine* the formation of an *artificial anus* may be indicated Of the cases reviewed by the author, resection was necessary in

only 1 instance Of the 16 patients, 5 survived, but none of them came under observation in the early stage Only 6 entered the hospital within the first 24 hours, and of these only 3 came within the first 12 hours (8, 9 and 10 hours) Two were brought in after 1 day, 3 after 2 days, and 2 after 4 days Of those who survived, 3 were brought in after 24 hours (1 on the third day) with pronounced symptoms of peritonitis

Injuries of the *mesentery* and of the *great omentum* may be associated with injuries of the intestine or may occur independently

Subcutaneous injuries of the *liver* were found in 3 of the cases reviewed, but in none was there a bradycardia or pain radiating to the right shoulder In 1 case the patient was dying and could not be operated upon In another, the diagnosis was made at autopsy after death from pneumonia, and the liver injury was found to be subsiding In the third case, the development of biliary peritonitis after tamponade of the bleeding rupture could not be prevented

Three isolated injuries of the *spleen* were observed In the case of a patient who was thrown from a wagon upon his left side, 2.5 liters (quarts) of liquid blood were found in the abdominal cavity. The spleen was removed and a transfusion of 600 cc of blood was given by the Percy method Death occurred from cardiac weakness on the fourth day In the case of a patient who fell from a roof 4 m high, from 2 to 3 liters (quarts) of fluid blood were found in the abdominal cavity and there was bleeding from the hilus of the spleen In this case also the spleen was removed and a transfusion of 600 cc of blood was given by the Percy

method Healing occurred by primary intention Eosinophilia was still present after 1½ years, but there were no symptoms In the third case, the patient fell from a haystack 6 m high and ran a pitchfork into his abdomen One liter of blood was found in the abdominal cavity The ruptured spleen was packed with iodoform gauze and a transfusion of 600 cc of blood was given by the Percy method Recovery resulted

Rupture of the *spleen* is characteristically followed by a shorter or longer asymptomatic interval The treatment of choice is splenectomy, although in one of the cases reviewed cure was obtained by packing.

Injury of the *pancreas*, which must be treated surgically by suture or partial removal with drainage, was not observed in the cases reviewed

In injury of the *kidneys* expectant treatment is indicated Of 7 cases of renal injury, nephrectomy was necessary in 2, in 1 for infection of a hematoma and in 1 for severe destruction of the kidney In the 5 other cases expectant treatment was given Among the characteristic symptoms are localization of the pains, irradiation of the pains to the testicles, colicky pains produced by blood clots, tumefaction and swelling in the lumbar region, and, the most important sign, hematuria Whenever possible cystoscopy was done

Injuries of the *suprarenal glands* and *ureters* were not observed

In 1 case there was an injury to the *bladder* which was first considered a contusion of the kidney on account of the rigidity and sensitiveness below the costal arch and the presence of blood in the urine On the third day, stabbing pains began suddenly in the hypogas-

trium Operation revealed a 10-inch sagittal, lacerated, and penetrating wound which extended from the fundus to the base and was infiltrated with blood The wound was sutured

The author states that successful results depend upon early surgical intervention which, in turn, depends chiefly upon a correct early diagnosis The operative technic is satisfactory, but the diagnosis must be improved In every suspected case, laparotomy should be done as early as possible, before hemorrhage or peritonitis threatens life

PENETRATING WOUNDS —

A E Billings and A Walkling (Am Surg 94 1018 (Dec) 1931) have reviewed 220 cases of penetrating wounds of the abdomen In 84 cases of *stab wounds* the total mortality was 25 per cent In 136 *gunshot wounds* the total mortality was 55.14 per cent The authors believe that unrepaired injuries were important factors causing death, and that injuries are overlooked more commonly than is generally believed The authors believe that blood transfusion should be routinely used in the hope that improvement in the patient's condition would allow a more thorough examination and repair of all visceral injuries

B C Willis (Ann Surg 96 161 (Aug) 1932) calls particular attention to the inadvisability of operating on *shotgun wounds* when small birdshot have scattered throughout the abdomen, as it is hopeless and useless to try to locate all the perforations These perforations are small and there is no discharge of mucosa through the openings The patients should be put to bed with the head of the bed elevated at a 10 to 15° angle, nothing by mouth; morphine sufficient to keep them quiet, hypodermoclysis of saline solution or

intravenous 5 per cent dextrose, with proper sterilization and dressing of the external abdominal wound Tetanus and perfringens serums should be given and a watchful waiting policy followed If these patients are operated on, the surgeon will succeed only in milking the infection through the holes in the intestine, greatly shocking the patient, and these efforts will be rewarded by a general peritonitis and death

According to F L Loria (Ann Surg 96 169 (Aug) 1932), 1299 cases of penetrating abdominal *gunshot injuries* were treated at the New Orleans Charity Hospital in the 32 years from 1900 to 1931, with a gross mortality of 62.3 per cent He carefully observed and studied a series of 153 cases, 137 of which were from the Charity Hospital The causes of death in this series are given Hemorrhage and shock headed the list, having accounted for 55 per cent of the fatalities, while general peritonitis accounted for 34 per cent of the deaths. Only 11 per cent died of other causes in this series Hemorrhage, as a rule, accounts for most of the shock seen in these cases, the depth of shock being directly proportional to the quantity of blood lost by the victim The mortality increases proportionately with the amount of hemorrhage Patients losing less blood have a considerably better chance for recovery The author considers that transfusions are of indispensable value, second in importance only to operative intervention as a therapeutic measure in these cases Only 16 of the 142 patients receiving hospital treatment in this series were given transfusions The mortality among them was 50 per cent

J Salleras (Semana méd. 2:1040 (Oct 1) 1931) discusses *ruptures of the*

bladder, extraperitoneal extravasations of urine, and traumatic wounds of the bladder. Ruptures of the bladder are produced by various types of trauma, but are almost always intraperitoneal. The most frequent causes are the passage of a wheel above the hypogastrium, kicks from horses, football injuries, and automobile accidents. Less frequent causes are blows, strains and twists. A rare cause is overdistention of the organ such as may occur in lavage of the bladder or during the crushing of a stone. Ruptures from muscular strain and from overdistention probably occur only when the musculofibrous structure of the bladder wall has been previously weakened, and which may be due to cancer, tuberculosis, ulcerative luetic lesions, or stones complicated by cystitis and pericystitis.

Ruptures may occur at any point, but are most common in the posterosuperior portion, where the superficial muscular fibers are most widely separated.

A large perforation is usually followed by shock, a rapid pulse, pallor, and coldness of the extremities. When the perforation is small, the general condition may not change. Among the local *symptoms* of a rupture are pain in the hypogastrium, an urgent desire to urinate, and the passage of only a few drops of urine tinged with blood. Frequently, the patient cannot urinate. In such cases the retention is of a special character, as it is not associated with pain or hypogastric fullness. There is often a certain amount of rectal tenesmus.

The *diagnosis* is based on a history of trauma, the presence of hypogastric pain, rigidity, hypogastric flatness, vesical tenesmus, and hematuria, and the findings of cystoscopic examination.

The *treatment* should consist of

measures to combat shock followed by suture of the perforation, drainage of the abdomen, and the introduction of a No 20 Pezzar permanent catheter. The patient should be put in the Fowler position to favor drainage.

The *end-results* depend on many factors but, in general, the chances for a successful outcome are best when operation is performed immediately. In the author's cases the operative mortality was 20 per cent.

Extraperitoneal extravasations of urine are not common. They may be caused by tearing of the pubovesical ligaments, separation of the symphysis, luxations of the symphysis as the result of falls from a height, fractures of the bony pelvis in which the fragments pierce the anterior or lateral wall of the bladder, and, in exceptional cases, obstetrical interference.

The *prognosis* depends upon the time operation is performed after perforation and the extent of the urinary phlegmon. In some series of cases the mortality has been as high as 70 per cent.

In wounds of the *bladder* caused in *surgical operations* the wound should be immediately sutured and a retention catheter introduced. If the injury is unrecognized, there is danger from extravasation of urine. Possible complications include vesicointestinal fistulæ and general peritonitis.

The *treatment* indicated is immediate suture and the prevention of complications. It is obvious that the procedure followed must vary according to whether the wound is intraperitoneal or extraperitoneal. As the operations are always atypical, it is impossible to lay down surgical rules to be followed. The choice of procedure must depend upon the conditions present in the particular case and the judgment of the surgeon.

An immediate laparotomy is urged by J W Hinton (Am J Surg 16 45 (Apr) 1932) in cases in which there is reasonable certainty of an injury to a hollow viscus from traumatism to the abdomen. If the diagnosis is questionable, however, through the symptoms being masked between those of a rupture of a solid organ, such as the liver, kidney or spleen, and retroperitoneal hemorrhage on the one hand, as against injury to a hollow viscus, it is to the patient's advantage to employ conservative methods of treatment rather than to submit him to immediate operation. If this principle is followed, a lower mortality and morbidity will be obtained in cases of injury to the abdominal viscera.

ABDOMINAL SURGERY.—

While doing an abdominal section, J F Percy (California and West Med 36 314 (May) 1932) emphasizes the importance of preventing the slowing up of the circulation in the posterior abdominal and thoracic veins, thus inevitably disabling the heart. He believes few surgeons realize sufficiently that the instant air is let into this visceral cavity, the rhythmic respiratory contractions of the abdominal muscles and the diaphragm, which play such an important part in the circulation of the blood, are lost. Under such conditions, and especially if the operation is prolonged, blood accumulates in the great posterior abdominal and thoracic veins because these two most important and efficient circulatory muscular units go out of commission with the opening of the abdomen. When the heart has lost this almost indispensable support, it gradually becomes fatigued and the circulation fails. At this point the anesthesiologist will frequently be found at-

tempting to whip it into better action with stimulants, often with disappointing, if not disastrous, results.

The technic necessary for preserving the circulatory functions of the diaphragm and of the abdominal muscles following the opening of the abdomen is extremely simple. The essential thing is the employment of a single long, dry **gauze sponge** to keep the liver and surrounding viscera crowded up under the dome of the diaphragm. (The sponge or pack is made from ordinary surgical gauze. The author has found that a useful average as to length is 15 yards (13.72 meters), with a width of 9 inches (23 cm). The latter is obtained by folding the gauze lengthwise 4 times.) When well done, this compensates for the removal of the tone of the abdominal wall. Important as subsidiary aid to the sponge technic is adequate **spinal anesthesia** with an added **general anesthesia** when relaxation of the abdominal muscles is not satisfactory, the **Trendelenburg position**, and a completely expanded long abdominal incision. The correct manner of introducing the sponge into the upper part of the abdomen is the key to its value. Not only does it serve as a pack in restoring the auxiliary circulatory functions of the diaphragm and abdominal muscles, but also, when placed without traumatizing the peritoneum in the slightest degree, it precludes the development of gas pains and the later dreaded adhesions.

POSTOPERATIVE COMPLICATIONS.—A comprehensive study of postoperative *rupture of abdominal wounds* with protrusion or prolapse of viscera has been made by S. Sokolov (Vestnik Khir 65 219, 1931), based upon an international questionnaire which was sent out to 1140 surgeons.

In all, 233 answers were received, 14 surgeons reporting 10 or more cases. At the top of the list are Hesse and Sokolov, with 36 cases, and Radlinski and Traczuk, with 31 cases

According to the reports of 18 surgeons, the incidence of wound separation in all abdominal operations ranged from 0.03 to 3 per cent. The author believes that many cases are not reported and that the correct percentage is between 2 and 3 per cent. Wound separation occurs in males twice as often as in females. Of the 13 cases of children with this complication reported, only 3 were girls. In children the operation was usually performed for intussusception. In adults, the most frequent cause for operation was malignancy, the next, peptic ulcer, the third, gall-stones, and the fourth, various forms of ileus. A *seasonal influence* was noted in that, especially among the northern people, wound separation occurred most frequently in the early part of the year. The author explains this fact on the basis of the general fatigue and a relative vitamin C deficiency present during the winter months.

None of the various proposed abdominal *incisions* can be regarded as a certain preventive of wound separation, but the complication occurs most frequently following median incisions, Paramedian, transrectal, Pfannenstiel, and even muscle-splitting incisions for appendiceal operations are occasionally followed by wound separation.

With regard to the part played by the *suture material*, it was found that most of the separations occurred in the cases in which silk was used. Nevertheless, the wounds separated in such a large number of cases in which catgut was used that, in view of the much less common use of catgut in the suturing of

fascia, the greater unreliability of the latter material seems to be clearly demonstrated.

The danger of wound separation is greatest between the fifth and twelfth days after operation. Most separations occur on the eighth day. In the cases reviewed it occurred rather frequently also on the day on which the skin sutures were removed.

The most common cause was pulmonary disease, anemia and cachexia were second, and wound infection was third.

In 411 cases the wound was tightly closed again, with 132 deaths (a mortality of 32 per cent), while in 203 cases, open treatment was used, with 72 deaths (a mortality of 35.4 per cent). Treatment with suture, therefore, is apparently preferable. Of the causes of death, peritonitis was the most common, pneumonia next, shock third, and cachexia last.

As a *prophylactic measure* against wound separation, the author recommends a diet rich in vitamin C, avoidance of the use of catgut for suture of the fascia, and, in the cases of patients who are *coughing*, the use of a large linen abdominal binder after the fifth day.

M. Sigalas (Rev. de chir., Paris 51 32 (Jan.) 1932) describes a rupture of the abdominal incision occurring 10 days after a subtotal hysterectomy. He states that postoperative eventration may occur early or as late as 12 years after operation, and may occur at any age. It is more frequent in women than in men. Laparotomies below the umbilicus are followed by eventration more frequently than laparotomies above the umbilicus. Midline incisions are followed by eventration more frequently than lateral incisions. The time of

removal of the skin sutures, the suture material left in the deep layers, and the presence of drainage are not causative factors, but a poor condition of the abdominal wall, the presence of a hematoma or suppuration, and sudden and repeated contractions of the abdominal muscles such as occur in coughing, vomiting, and straining at stool, are of importance. General causes, such as cancer and syphilis, may retard cicatrization, but are not of prime importance.

As a rule, there is a sudden discharge through the dressing but hardly any pain. The protruding viscera should be rinsed with normal salt solution and replaced, and the abdominal wall approximated with metal sutures passed through all of the layers, or with heavy silk sutures. Drainage of the abdominal wound with sterile gauze is important. As a *preventive*, tight abdominal bandages should be used. In the cases of debilitated patients, the stitches should not be removed before 2 weeks, the patient should be kept in bed much longer, and when he gets up he should wear an abdominal support. Coughing should be prevented if possible, and light bowel movements facilitated.

In 161 cases of early eventration collected from the literature, the mortality was 18.5 per cent. In the cases of late eventration there were no deaths.

POSTOPERATIVE TREATMENT—Gastric Lavage Following Laparotomies.—Benjamin (Minnesota Med 15: 509 (Aug.) 1932) draws attention to the benefits obtained in the treatment of postoperative vomiting, pain and dehydration, by frequent gastric lavage following laparotomies. He urges a more general adoption of this plan of treatment. A Levin tube (tube

with a small catheter tip which can easily be passed through the nose) is passed through the nose into the stomach and the catheter attached to a tube connected with a bottle. Gases and toxic substances are at once extracted from the stomach and the patient soon begins to show the effects of the treatment. This method of avoiding gas accumulation and vomiting was first attempted by the author, in 1924, in a patient with a perforated duodenal ulcer that could not be securely closed at the time of the operation. It was a simple method of siphonage whereby the gases and liquids could escape. In order to measure the amount of gas siphoned and the fluids assimilated, a known amount of air and water must be in the suspended bottle and tube in the floor bottle submerged beneath a known amount of water. The known loss of fluid in the suspended bottle subtracted from the amount siphoned into the bottle on the floor will give the amount extracted from the stomach. This, subtracted from the amount of fluid taken by mouth, determines the amount retained. These figures added for 24 hours will give the daily amount of fluid absorbed. The amount of gas removed is determined by measuring the amount of gas in the suspended bottle, subtracting therefrom the known air in the top of the suspended bottle at each filling of the bottle with water, and adding these figures for the daily output. It is essential that the apparatus be carefully watched to determine whether there is perfect suction or not, and to see that no particles of food remnants or mucus clog the small openings and lumen of the tube.

Troublesome distention following abdominal operations may be controlled by the use of diathermy, as outlined by W. L. Denney (Canad. M. A. J. 26: 430).

(Apr) 1932) The procedure is most useful in those cases in which, following rupture of the appendix, the distention and toxic state become pronounced and dangerous. There is no difficulty in its management. It causes the patient no physical or mental discomfort, even acting as a soporific. It can be used as often as is necessary, and adds no extra burden to the circulatory system, as may be the case in which toxicity is marked. A **saline-dextrose solution** intravenously may be of assistance in overcoming the toxemia and increasing peristalsis.

ABORTION.—INEVITABLE.

—In a discussion of hormone tests in the diagnosis of fetal death and inevitable abortion, P. B. Bland, A. First and P. Roeder (Am J Obst and Gynec 23:83 (Jan) 1932) claim that death of the embryo or fetus is heralded by a marked diminution in the production of estrin, which consequently, brings about negative *estrin tests*. These authors found this to be true in 8 instances where death of the embryo was suspected, and where subsequently the uterine contents were expelled. Four of these 8 cases rendered positive *Aschheim-Zondek tests*. They conclude that repeated negative estrin tests are strongly indicative of impending termination of pregnancy.

C. Mazer and L. Goldstein ("Clinical Endocrinology of the Female," W. B. Saunders Co., Philadelphia, 1932) claim that the persistence of a pregnancy reaction in a case of suspected death of the embryo or fetus does not necessarily imply that the embryo is living. However, when the pregnancy reaction is repeatedly negative, death of the ovum may be presumed.

THERAPEUTIC ABORTION.—

W. Harris (Am J Roentgenol 27:415 (Mar.) 1932) points out that thera-

peutic abortion produced by **x-ray irradiation** offers a method without mortality or morbidity for ending a pregnancy in cases in which surgical intervention is contraindicated and in which future pregnancy cannot be countenanced because of serious and permanent systemic disease. The sterilizing effect of this form of treatment is of special benefit to patients suffering from chronic disease. Partial shielding of the ovaries will prevent amenorrhea in some cases. Of 138 patients treated, complete success was obtained in 129. Three of the 6 failures showed dead fetuses. The author has had 4 failures in the last 106 cases. The dosage is 60 per cent of a skin erythema dose into the gravid uterus. The x-ray apparatus must be accurately calibrated, especially for depth dose. There is usually no danger in waiting for expulsion of the fetus if the uterus has stopped growing and if there are no signs of toxic absorption. If failure is discovered before the pregnancy has advanced to 16 weeks, the treatment may be repeated. If the patient becomes pregnant again at some later date, a second x-ray abortion should be done. The average interval between treatment and expulsion of the fetus is 4 weeks. The exact mechanism underlying the death of the fetus is not entirely clear. This procedure, when undertaken, demands close cooperation between the gynecologist and the radiotherapist.

ACACIA.—As a result of a study of the changes in the blood after an infusion of a 6 per cent solution of gum acacia, M. A. Walker (Proc Staff Meet Mayo Clinic 6:623 (Oct 21) 1931) offers an explanation for the incompatibility of acacia solution and citrated blood. Specimens of citrated

plasma from 10 different persons were used to set up a series of titrations with 6 per cent solution of acacia, solutions of calcium chloride and 6 per cent solution of acacia from which the calcium had been precipitated. All specimens of plasma were coagulated by 6 per cent solution of acacia, and by either 0.05 or 0.113 per cent solution of calcium chloride. The clot which resulted was grayish white, tough and rubbery. In no case did coagulation occur when the specimens of citrated plasma were mixed with the calcium-free solution of acacia.

Apparently calcium, present in relatively high concentration in solution of acacia (approximately 5 times the concentration found in normal blood), causes coagulation *in vitro* of citrated blood. In an average infusion of 500 cc (1 pint) of 6 per cent solution of acacia, the total quantity of calcium injected is only 0.25 Gm. (4 grains), much less than is frequently injected without ill effects. Hence there is no reason, according to Walker, to fear that any coagulant action might occur *in vivo*.

Walker has also devised a satisfactory method for counting the leukocytes after infusions of solution of acacia. The usual method of dilution of the blood with a 1 per cent solution of acetic acid has proven to be very unsatisfactory since, for a period of 3 to 5 days following its injection, the gum acacia exists in the blood and is precipitated in the counting chamber and also prevents the proper hemolysis of the erythrocytes. Walker uses as a diluting fluid a solution of tenth-normal hydrochloric acid and finds that this stronger acid hemolyzes the erythrocytes without destroying the leukocytes.

C. K. Maytum and T. B. Magath

(*Ibid* 7:216 (Apr. 13) 1932) report a case exhibiting anaphylactic sensibility when a second injection of 6 per cent solution of acacia was administered 7 months following the first injection. As a result of this experience and experimental work with animals, the authors conclude that acacia seems to be a mild antigen and that under rare circumstances patients may exhibit anaphylactic symptoms following its use, provided a previous dose has been administered some weeks or months before.

ACETARSONE.—UNTOWARD EFFECTS.—*Stovarsol*, a brand of acetarsone, is not, according to J. A. Kolmer (*Am. J. Syph.* 16:53 (Jan.) 1932), recommended for the abortive (prophylactic) treatment of syphilis of human beings, but is probably a useful compound for "follow-up" or "consolidation" therapy, after courses of the trivalent arsenicals or bismuth, in the treatment of syphilis of those individuals possessing sufficient tolerance for this agent. However, *stovarsol* by oral administration is capable of producing gastroenteritis, neuritis and dermatitis, and must be carefully watched during oral administration and particularly in the case of individuals with a lowered tolerance for arsenic.

Arsenic has proved to be such an effective parasiticide in the treatment of endamebiasis that it will probably continue to be used, although a less toxic arsenical preparation will be welcomed.

According to the report of P. W. Brown and A. E. Osterberg (*Am. J. M. Sc.* 182:257 (Aug.) 1931), who made a study of the toxicity and rate of elimination of the organic arsenicals used in the treatment of endamebiasis, *stovarsol* is less rapidly eliminated than *treparsol*.

and the possibility of untoward sequela developing is increased with the former drug

ACETYLCHOLINE.—PHYSIOLOGICAL ACTION.—Considerable interest in the possible value of acetylcholine in the treatment of vascular disorders has arisen recently. The pharmacological and physiological basis for advocating its therapeutic use rests chiefly on experimental demonstrations of its pronounced vasomotor action in anesthetized and pithed animals. Comparatively little definite knowledge exists of its physiological effects when administered to man.

In a study of the cardiovascular responses in man to the intravenous and intraarterial injection of acetylcholine, L. B. Ellis and S. Weiss (*J. Pharmacol. and Exper. Therap.* 44:235 (Feb.) 1932) carried out the intravenous injection of acetylcholine in 17 normal subjects and the intraarterial injection in 4 normal subjects. The following observations were made.

1 The action of the drug was found to be transient since a given rate of injection could be maintained for a prolonged period of time, with no evidence of cumulative action, and since the effects disappeared very rapidly following cessation of the injection.

2 The symptoms produced were flushing of the head and upper part of the body, throbbing in the head, palpitation, sweating, salivation, lacrimation, substernal constriction, nausea and vomiting.

3 Either no effect or a slight rise in the cardiac rate occurred.

4 In only 3 of 13 cases was there any appreciable lowering of the systolic or diastolic arterial blood-pressure.

5 The effects of acetylcholine ad-

ministered intravenously to man and anesthetized animals are qualitatively similar, but man is very much more tolerant to the drug than animals.

6 Unless acetylcholine acts in disorders of the arteriolar system differently than in normal subjects, it cannot be considered a useful therapeutic agent in such conditions.

J. F. Wilkinson (*Brit. J. Exper. Path.* 13:141 (Apr.) 1932) investigated the stimulating influence of acetylcholine on gastric secretion in normal and abnormal subjects. He found that its effects on the gastric secretion in normal and abnormal individuals was uncertain. In the majority of normal cases there is an increased secretion of free hydrochloric acid and total chlorides following injection, but it is much less marked than that produced by histamine. The response increases slightly with the dose of acetylcholine used. A small group of normal subjects failed to display any alteration in secretion. Acetylcholine is not so powerful as histamine and frequently fails to disclose pseudoachlorhydric conditions, according to Wilkinson. It has rather more marked effects in cases showing hypoacidity and Raynaud's disease, but there, also, histamine is more powerful. Atropine readily counteracts or prevents the effects of acetylcholine on the gastric secretory mechanism.

ACETYLSALICYLIC ACID.—UNTOWARD EFFECTS.—In commenting on drug idiosyncrasies in allergic patients, R. W. Lamson and R. Thomas (*J. A. M. A.* 99:107 (July 9) 1932) state that an abnormal response to acetylsalicylic acid is probably more common than to any other drug and that nostrums containing this compound are not "harmless" from the standpoint of

the allergic individual. Several cases are reported by the authors which substantiate this point of view, one patient having died within a short time after taking a small dose of such a nostrum.

SOLUBILITY.—By a series of experiments, A H Clark (J Am Pharm A 21 383 (Apr) 1932) has shown that in a solution of acetylsalicylic acid in potassium citrate the hydrolysis of the acid, which is complete in about 2 weeks, can be reduced to about 30 per cent in 4 to 6 days by the addition of sugar, and that thereafter no further hydrolysis takes place within 30 days. This is assuming that the rate of hydrolysis of the acid is accurately shown by the increase in acidity. An acetylsalicylic acid-glycerine-potassium citrate solution behaved in much the same manner. The best proportions of acid potassium citrate and water seem to be about 1 of acid, 3 of potassium citrate and 15 to 20 of water. Such a solution saturated with sugar was found by Clark to undergo the least change.

ACNE.—There is evidence, both from studies of identical twins recorded in the literature and from those based on patients' histories, that there is a familial and heritable element in predisposition to acne vulgaris, according to J H Stokes and Allen D King (Arch Dermat and Syph 26 456 (Sept) 1932), which should be considered in prognosis and treatment.

The incidence of acne in the parents of patients with acne is 26 times that in the parents of persons who have never had acne. There are reasons to suspect that the heritable factor involves the element of pyogenic susceptibility. Patients with seborrheic dermatitis exhibit a more pronounced family history atopy than did those with acne.

ACNE ROSACEA.—Seventeen cases of acne rosacea were reported by S Ayers, Jr, and N P Anderson (Arch Dermat and Syph 25 89 (Jan) 1932) in which *Demodex folliculorum* was found either in pus from superficial lesions or in dry follicular scales, whereas it was absent from the pus in 13 consecutive cases of acne vulgaris.

The acne rosacea was either improved or clinically cured by the use of strong antiparasitic ointment and the daily use of soap and water. The authors conclude that *Demodex folliculorum* is one of several possible causes of acne rosacea.

ACOUSTIC TUMORS.—Of 3 members of the same generation of a family reported by Louis Minski (J. Neurol and Psychopath 12:289 (Apr) 1932), 1 had double acoustic neuroma with several similar smaller growths on the seventh and twelfth cranial nerves; another died with tumors on the roots of the spinal cord which were only examined macroscopically, and the third was diagnosed by neurological examination, x-ray evidence of internal auditory meati involvement, and histologic examination of one of the neurofibromata removed from the arm. The 2 acoustic tumor cases showed increased protein in the cerebrospinal fluid with zone I curves. All 3 patients gave a history of a blow preceding the onset of symptoms to which no significance was attached. The remainder of the family gave no suggestive signs or history of neurofibromatosis.

ADDISON'S DISEASE.—METABOLISM.—A study of the chemical and metabolic changes observed in cases of Addison's disease was made by C

H Greene, L G Rowntree, W W Swingle and J J Pfiffner (Am J M Sc 183 1 (Jan) 1932) They found that quantities of the various constituents of the urine in this condition corresponded to the lower levels of the usually accepted normal standards Creatinuria was present in a considerable proportion of cases Retention of practically all urinary constituents was noted in one case in the course of a period of diminished urinary output The nitrogen balance of those patients who were losing weight was negative The majority of patients gained weight as a result of treatment with the suprarenal cortical hormone In such cases the nitrogen balance became markedly positive

The period of crisis was characterized by gastrointestinal upsets, nausea and vomiting, pains, circulatory collapse, low blood-pressure, dehydration and renal insufficiency The effect of the last two dominated the chemical picture at this time

TREATMENT.—Over a period of 5 years, 62 cases of Addison's disease have come under the care of J M Rogoff (J A M A 99 1309 (Oct 15) 1932) Of this group, 21 were treated with interrenalin; 12 did not receive interrenalin The only reliable criterion for the potency of an adrenal cortical extract at present available is its capacity to prolong life and good health in completely adrenalectomized animals Therefore, the only reliable criterion for its efficacy in Addison's disease is its capacity to prolong life in patients with the disease Nearly all the patients obtained definite relief from the usual symptoms

Of the 21 cases treated with interrenalin, there were 13 males and 8 females The age ranged from 16 to 64 years The data obtained in his series

of cases leave no doubt that interrenalin administered orally in the form of extracts made from the cortex of adrenal glands is effective in prolonging life and relieving symptoms in advanced Addison's disease

Permanent relief or "cure" should not be expected, even if the pure cortical hormone were available unless the underlying cause of the disease has subsided before extensive degeneration of the adrenal glands has occurred and the necessary conditions for cortical regeneration still exist

If early diagnosis of adrenal insufficiency or Addison's disease could be made with certainty and if the underlying factor can be controlled, it is more probable that cure might be effected by supplying the necessary cortical function, permitting regeneration of the gland to occur more readily

The treatment is based on the concept that the disease is the result of lack of function of the interrenalin gland (cortex) and not of the chromaffin tissue (medulla), since it is the cortex and not the medulla that has been proved to be the indispensable portion of the gland Treatment is directed toward the correction of 3 principal factors. (a) intoxication, (b) metabolic disturbances, leading to the intoxication, and (c) underlying or associated conditions Intoxication, clinically indicated by gastrointestinal disturbances and nervous manifestations, is combated by daily intravenous injections of normal saline solution containing 5 per cent of dextrose. The metabolic disturbances are corrected by the administration of interrenalin in the form of extracts of adrenal cortex prepared from glands of sheep or cattle Interrenalin is given by mouth, except when the stomach is irritable The amount,

in 4 to 8 doses a day, corresponds to the cortical substance of 1 to 2 beef adrenals or about 5 to 15 sheep glands

The administration of epinephrin has often proved decidedly harmful and may cause alarming symptoms. Adrenal regeneration is favored by prolonged rest, careful avoidance of physical and mental strain, regulation of the diet and attention to proper elimination. A most favorable diet included restricted protein intake and a corresponding increase in carbohydrate foods.

Interrenalin, the hormone of the adrenal cortex, can be extracted from the cortex by various solvents, in neutral, faintly acid or faintly alkaline mediums.

Preparation of Extracts—Extracts, containing sufficient quantities of interrenalin to prolong life and ameliorate symptoms, by intravenous injection in completely adrenalectomized dogs, can be prepared as follows. Interrenal gland tissue is obtained by separating the cortex from the medulla of adrenals of sheep or cattle. The cortex is macerated with 1 or 2 volumes of physiologic solution of sodium chloride, to which is added a volume of glycerin equal to about one-fifth of the quantity of adrenal cortex used. The mixture is agitated in a mechanical shaker for from 1 to 2 hours, or allowed to stand overnight in a refrigerator, shaken thoroughly at intervals. Ten volumes of alcohol (95 per cent) is added and the extraction continued for about 24 to 48 hours, with frequent shaking. The liquid portion is separated from the residue by decanting or straining, and the residue is again extracted with a mixture containing 10 per cent alcohol and 5 per cent glycerin in physiologic solution of sodium chloride. About 2 or 3 volumes of this mixture is used and the extraction continued for from

24 to 48 hours. After separation of the liquid from the adrenal residue, it is added to the first portion. The alcohol is then removed at low temperature, by vacuum distillation. The product is now subjected to 2 or 3 extractions with petroleum benzine or benzene. To the aqueous portion is added a sufficient quantity of physiologic solution of sodium chloride to make a final product corresponding to 1 Gm cortex = 10 cc extract.

ALCOHOLISM.—N B Heller (J M Soc New Jersey, 28:467 (June) 1931) has pointed out that cases of chronic alcoholism during the summer months frequently exhibit skin lesions which clinically cannot be distinguished from those seen in cases of pellagra. These he classifies as cases of *alcoholic pseudo-pellagra* and offers as an explanation for the appearance of the skin lesions the fact that, in addition to there being a substitution of alcohol for an adequate diet, which should adequately supply amino-acids, mineral salts and vitamin B, these patients have exposed themselves to the direct rays of the sun, which act as an exciting cause on a tissue which has been lowered in resistance by the dietary deficiency. In all of the cases reported the dermatological changes noted were sharply demarcated areas of pigmentation, and affected symmetrically the dorsal surface of the hands and lower third of the forearms. On a generous diet, rich in fresh fruits, vegetables and meats, all of the cases reported made a complete recovery.

Studies on *the after-effects of tactual sensations*, made by W. Bromberg (Arch Neurol and Psychiat 28:37 (July) 1932) on patients with alcoholic and schizophrenic psychoses, showed that the tendencies toward change in

the after-effects found in normal persons were present in the patients. In persons suffering from alcoholism the after-effects change in such a manner as to indicate that there are organic changes in the perceptive field. These organic changes may be in the nature of sensory or vestibular influences. In alcoholism, changed sensory perception is basic for the existence of hallucinations. In patients with schizophrenia, there are no changes in the perceptive field, hallucinations among the patients are related to the special thought processes of schizophrenia. According to Bromley, it is still an open question in what way these special thought processes influence secondarily the perceptual field.

DIAGNOSIS—In tests on 30 individuals, R. Matossi (Ztschr f klin Med 119 268 (Dec 18) 1931) demonstrated the different behavior of alcohol in the blood of persons who abstain from alcohol or who drink it rarely and in small quantities, to that in persons addicted to alcohol. In persons who are not habitual alcohol consumers, the increase as well as the decomposition of the alcohol in the blood is more rapid than in addicts. Whereas in those who are not habitual drinkers the alcohol has usually completely disappeared within 5 hours, in persons with chronic addiction to alcohol it is present for 9 hours or more. This observation is valuable in the diagnosis of chronic alcoholism and the author cites 1 case which clearly illustrated the reliability of this test. The alcohol content of the cerebrospinal fluid does not go parallel with that of the blood but persists much longer. This indicates that in the blood the alcohol is oxidized more rapidly than in the cerebrospinal fluid.

In an attempt to establish criteria for a more definite diagnosis of drunken-

ness, S. Smith and C. P. Stewart (Brit M J 1 87 (Jan 16) 1932) carried out a number of experiments on the *excretion* of alcohol by human subjects. In all these experiments the excretion both by the lungs and by the kidneys was measured, and the condition of the subjects with respect to intoxication was observed by various psychologic tests and by the routine methods of examination used by police surgeons. The results of the experiments do not support the idea that estimation of the concentration of alcohol in either breath or urine is a valuable aid in diagnosis. Obviously, with high concentrations, such as 0.4 to 0.5 per cent, there is no doubt as to the diagnosis, but in these cases the circumstances are such that even without the analysis of urine there is no difficulty. Carter takes 0.2 per cent as the dividing line above which a diagnosis of drunkenness is justified, and similar standards are set up by others, but to the authors this appears a dangerous procedure. They have met a case of undoubted drunkenness—a semicomatose condition—in which the concentration of alcohol in the urine never reached this level, and that in an almost teetotal subject who drank 250 cc ($\frac{1}{2}$ pint) of whiskey. Though this does not constitute a serious indictment of the validity of the method of diagnosis, since it is claimed only that a man showing over 0.2 per cent of alcohol in the urine is drunk, and not that one showing less than this is sober, other results do invalidate the test, for in certain of the experiments the subjects were classed as sober by the police surgeon and showed no evidence of being affected by alcohol when tested by psychologic methods, but were nevertheless excreting urine containing more than 0.2 per cent of alcohol. Hence, with

udation into and swelling of the bronchial mucous membrane, and (3) occlusion of the bronchi due to excessive secretion of mucus. The evidence is still only indirect, but deductions may be effected in each individual case.

The presence of foreign material in the bronchial tree induces contraction of the muscle. In the presence of a sensitivity it is very definite that spasm does occur from any of the various stimulants, but constriction itself is not the whole story. Protein sensitivity may precipitate an attack, but bronchial spasm in itself cannot explain the syndrome of asthma.

Edema of the mucous membrane is also present, but is not in itself enough and is very likely a part of the inflammatory reaction present. Bronchoconstriction and edema are factors, but essentially the paroxysm is due to the hypersecretion of the bronchial glands, causing bronchial occlusion. The extent of plugging of the bronchi by mucus determines the extent and duration of the attack, and the amount of tree occluded in previous attacks is a dominant factor. The duration, severity, and frequency of these attacks play important rôles.

H. B. Wilmer and H. M. Cobe (*Ibid.* 3:389 (May) 1932) describe a case of asthma due to a *mold*. Diagnosis is difficult in all cases where patients do not react to the usual atophens. They insist a careful and detailed history may give the answer before the skin tests are done.

A greenhouse worker had violent asthmatic seizures. Adrenalin gave only mild relief. The history showed that the patient was free from asthma most of the year. He had severe paroxysms only after a mold had appeared on the leaves of the tomato plants under

cultivation. His attacks lasted with increasing severity until the plants were taken up. He was entirely free of asthma 2 weeks after this operation. Skin tests showed a 4 plus reaction to the *cladosporium fulvum*, with negative reactions to tomato leaf extract. *Aspergillus niger* and *fumigatus* were also negative. This is a very striking case of specific sensitivity, the atopen being very rare. The patient moved away from the greenhouse and was injected with an extract of the offending mold. The results obtained were very rapid and marked improvement was shown immediately and a cure effected.

Recently, according to S. J. Taub (*Ibid.* 3:586 (Sept.) 1932), it has been emphasized that *yeasts* and *molds* are a causative factor in bronchial asthma. Both are present in dust and are usually inhaled. It is surprising that more cases of asthma due to ingestion of yeast have not been reported. A case of asthma of this type was observed by the above author.

A boy 5 years of age had asthmatic seizures which began at the age of 2½ years, preceded by coryza and nasal discharge. He also gave a history of eczema in infancy. Severity of the attacks increased. Skin tests were made and a strongly positive reaction to yeast was obtained. All other tests were negative. Passive transfer was positive on 2 nonallergic individuals. The following treatment was instituted: elimination of bread, cakes, grape juice and fermented beverages, desensitization by a yeast solution. The results have proven very satisfactory.

L. R. Grant (*Ibid.* 3:469 (July) 1932) reports 6 cases of *flaxseed* sensitization. Of this group, 5 were asthmatics, 3 of which had complete relief by avoiding contact, while the

others were relieved after desensitization. Patients living in rural communities are more apt to be affected. One case suffered from bronchial asthma after contact with a linseed meal. Another case, one of perennial hay-fever, suffered when he fed chickens a mash. A third case, a woman with severe asthma and perennial hay-fever, could not go near chicken feed. All 3 cleared up after avoiding contact with any flaxseed.

Two cases of gastrointestinal allergy were reported due to ingestion of linseed cake.

Flaxseed is in itself very irritating and can give asthma or gastrointestinal symptoms both by inhalation and ingestion. Reactions are often violent. The sensitization is to flaxseed itself and not to various other products such as linseed oil and linen.

Flaxseed crushers in the linseed mills are known for their dermatoses. This is very probably due to trauma and heat and not to any allergic condition. Cases sensitive to flaxseed show good results if the offending substance is removed and by desensitization if this cannot be accomplished.

W. W. Duke (*Ibid* 3 495 (July) 1932) reports 2 cases of *drug* allergy, one sensitive to *ether* and the other to *chlorine*. A youth had coryza, cough and asthma when exposed to ether fumes. Skin reactions were negative to all substances but ether. A drop of ether applied to the skin caused within a few minutes a typical wheal. The patient was not sensitive to any of the other anesthetics. Passive transfer in this case was not successful.

Another patient, a doctor with a family history of allergy, had cough, coryza and asthma while in his office. The cause was traced to the use of *Dakin's*

solution. Inhalation of chlorine gas precipitated an attack almost immediately. He was relieved by inhalation of aromatic spirits of ammonia and adrenalin was unnecessary. Passive transfer was also unsuccessful in this case.

This is in itself a contact type of drug allergy and is usually but not always confined to the point of contact with the physical agent. Reactions of any degree occur only if a large body area is exposed.

S. J. Parlato (*Ibid* 3 459 (July) 1932) has made a study of the *caddis fly*, *butterfly* and *moth* with reference to asthma and allergic coryza. He places the caddis fly first in the reagenic activity, the moth second and the butterfly third. Four case reports showed very definitely that the above insects were the offenders. Charts are available in each case to show the positive results of passive transfer. From these tables it was learned, as has been previously stated, that the caddis fly is first in severity.

From the practical side these experiments show that immunologically, these 3 flies can be taken as one group. The atopy of the butterfly and the moth are identical and that of the caddis fly similar to the other two. It is necessary, therefore, in regions where these insects abound, to study any refractory patient from the standpoint of the flies mentioned above. This paper stresses the fact that there are many excitants of allergy. This makes the list more complete and, in so doing, diminishes the chance of failure in treatment.

J. W. Towey, H. C. Sweany and W. H. Huron (*J. A. M. A.* 99 453 (Aug 6) 1932), in adding to the list of offenders in allergy, states that asthmatic conditions may be caused by

any protein substance that may be inhaled or undergo absorption. The spores of *fungi* are the principals in his publication. The employees of a railway tie plant were used as the subjects of experimentation. Previous to working in the plant and while on vacation, these men did not have any signs of asthma. Ten men were examined and tested. All were definitely asthmatic and were examined in the acute stages. Eight men were bark peelers and 2 were shovelers of bark. No record was on hand of any cases of asthma except those who came in direct contact with the bark. All laboratory studies were very exhaustive and complete.

The case histories cited show that there was a very definite relation between the asthmatic attacks and the contact with the bark dust. Wood dust was ruled out because there was freedom from asthma in all these patients when in contact with this and not that of the bark. The dust proved to be the spores of a fungus only classified tentatively. F. M. Rackemann, in discussing this series, points out the possibility of dealing here with a true infection and interrogates whether there is a history of allergy from the standpoint of the family and also in the patient's past. And the author, regarding his cases as atypical, cites this fact, that here an unusual allergic manifestation may be dealt with.

The fact that *climate* influences to some degree all asthmatics and very often is of prime importance in some difficult and unrecognizable cases, is stressed by C. Jimenez-Diaz, B. Sanchez Cuenca and J. Puig (J. Allergy 3: 396 (May) 1932). Clinical experience shows that there are certain localities that are relatively free from asthma and still may contain or have inherent

in them the same atopens that are present in another locality where asthma is common. Climate may be the deciding factor.

In a series of 292 cases studied, only 17 could be classified as climatic asthmas, 14 of these were patients from a village on the coast and 3 were from humid localities. In these cases, on going inland, marked relief was noted. Seaside and climatic asthma were to all practical purposes used synonymously by the author.

Climatic and cases of house asthma often have the same aspects and are etiologically similar. The medium for carrying such things as fungi in dust may be the same in different localities, as it often is in another residence. The point is stressed that even in localities where climatic asthma is extant, the chief focus of sensitivity may be in the dwellings and the atmosphere may act as the vector of the atopens. True climatic asthmas are nearly always coastal and due largely to abundant fungi in the dust, in the air, and on household articles in the houses.

COMPLICATIONS.—J. Harkavy and S. Hebard (Arch. Int. Med. 49: 698 (Apr.) 1932) reported 400 cases of asthma in adults. In this series there were 9 that developed *arthritis* in addition to their asthmatic attacks. The ages of these patients varied from 36 to 59 years. The arthritis was of the migratory type. Only slight redness, swelling and pain were noted in the joints affected. No fever was present and no sequelæ were noted afterwards in the parts. In 5 of this group, no reactions to the usual proteins were found. The other 4 had a protein sensitivity but elimination of the offenders had no effect on the asthma or the arthritis. It was then assumed that

sinus and lung infection were the etiologic factors

It was evident in all these cases that the onset of asthma came relatively long before the arthritis. This may be explained from the standpoint of the joint, the secondary shock organ, requiring a longer time to be set into action than the lung, assuming it to be the primary shock organ. This is all, of course, contingent on the acceptance that there are many cases of asthma due to bacterial allergy from chronic foci of infection.

Clearing up of the foci in the sinuses and the subsidence of the focus in the lungs brought about complete freedom from arthritis in 8 of the series and marked relief of asthma in all of the cases. The author concludes that the allergic state is very probably part of the immunologic mechanism accompanying infection.

TREATMENT.—S. S. Leopold and S. G. Stewart (*J. Allergy* 2:425 (Sept) 1931), remembering that clinical experience has taught that intercurrent infections that produce fever in asthmatics are often accompanied by freedom from paroxysms, have produced fever artificially for relief of asthma. Most chronic infections are favorably influenced by fever. Protein therapy was used, but it is dangerous in this disease and results are violent and of short duration. Mechanical means, hot baths, heated air and diathermy were all investigated.

Seven case reports were published, 5 from intercurrent infection and 2 on which diathermy was applied. The 5 with accidental fever were materially relieved during the high temperature and for several days afterward. Remissions were not as marked in those in which mechanical means were used.

Forty-four treatments were given to 7 patients and 60 hours was the longest any of these was free. Three patients had both accidental and mechanical fever induced, but the results from therapeutic induction were not comparable with that incurred by other means.

S. M. Feinberg, S. L. Osborne and M. L. Afremow (*Ibid.* 2:414 (Sept) 1931), observing the same clinical findings as noted above, *i. e.*, fever in chronic infections, have also applied artificial fever in the treatment of asthma. They applied the same method in the production of fever as that used in cases of general paresis. The technic is given in detail. A low voltage high milliamperage current was used. They found that patients vary widely in the amount of current necessary to produce fever. Usually 1½ to 4 hours were necessary to attain the desired temperature. A slower rise was noted in negroes.

Two case reports were given. One, a 38-year-old colored male, had asthma for 2 years following a cough, with attacks every evening between 5 o'clock and bedtime. Skin tests and physical examination were negative. After the first treatment, he had 17 days without an attack, then 2 attacks and 9 days of freedom. He then had 2 days of asthma and 3 months afterward he was still free of asthma. A number of patients treated by this method gave highly encouraging results. It is a nonspecific method and each case must be carefully studied before such treatment is considered safe or indicated.

The report from the Asthma Research Council to October, 1931, page 6, shows that the subject of urinary proteose is one of the main topics of research and discussion. It has been shown that during an asthmatic seizure

certain marked changes take place in the blood and urine and that there is an albuminous substance excreted in the urine during this paroxysm. It has been proven that this is of a protein nature and that an asthmatic patient is very sensitive to his own proteose. Re-injection of the substance into a patient often produces violent asthmatic attacks. This substance has also been found in the urine of hay-fever patients. It is unusual for an asthmatic to react to the proteose from another's urine.

Injections of small doses of this substance into a patient seem to desensitize him to a certain degree. Some results are very satisfactory. The treatment is still under discussion and research is very active in this field with reference to the preparation of the substance and its use in treatment. It may be found and used in other allergic conditions than asthma or hay-fever.

In a paper read before the First International Congress on Asthma, at Mont Dore (French M. Rev. (July) 1932), G. H. Oriel, of London, noted that in allergic patients there are several definite modifications of the blood and urine. Most important is that during the paroxysm of asthma there is in the urine a substance he calls **Substance P.** which has the characteristics of albumoses. This substance can be used therapeutically in dilutions of 1:1,000,000 and 1:100,000. It is reactive in experiments and positive on passive transfer. The author believes this to be a product of cell destruction and that the allergic patient is sensitive to his own altered tissues.

HAY-FEVER.—ETIOLOGY.—G. T. Brown (J. M. Soc. New Jersey 29:483 (June) 1932) stresses the fact that there are 3 types of *seasonal hay fever*, the early *spring type* due to trees,

the *spring and summer type* due to the grasses and plantain, and the *fall type* due largely to the ragweeds, with other atopens secondarily involved.

The tree type constitutes 4 per cent of the group, spring and summer 2 per cent, and the fall variety 64 per cent. One-fourth of the spring and summer cases are also fall cases. From records, about 40 per cent of the spring cases develop asthma, while 50 per cent of the fall type at some time have asthmatic seizures.

The etiology in all of these cases, of course, is pollen which is the male fertilizing element of the plants. Many pollens are enumerated from early spring to late fall. Nearly all of the spring and summer cases are sensitive to 6 grasses: sweet vernal, June grass, orchard grass, perennial rye, red top and timothy. The ragweeds are the chief offenders in the fall. It is very necessary to test each patient with all of the pollens.

SYMPTOMS AND DIAGNOSIS.

—Symptoms of the *perennial type*, according to G. T. Brown (Arch. Otolaryn. 15:202 (Feb.) 1932), are practically the same as the seasonal, *i.e.* nasal block alternating with rhinorrhea and paroxysmal sneezing. To be differentiated from this condition are sinus infection, nasal trouble of any kind due to mechanical causes, recurrent head colds and excessive nasal discharge due to cerebrospinal causes. The author quotes Chevalier Jackson "all is not asthma that wheezes" and he adds, "all is not hay fever that sneezes."

History-taking is of prime importance, *i.e.* family history of asthma, hay-fever, urticaria or eczema and, in the same manner, the conditions just mentioned in the patient himself. Often a careful history will reveal the offend-

ing reagent before any testing is done. Detail should be the paramount rule in allergic history-taking.

Nasal examination may give a definite lead as to whether or not the condition is allergic. The allergic mucous membrane is pale and water-logged in appearance. The bacterial mucous membrane is inflamed and red and the discharge contains pus. A secondary bacterial sensitivity may be superimposed on an allergic mucous membrane which complicates the picture.

Skin tests are done in whatever manner is desired for the animal epidermals, foods, bacteria, pollens and miscellaneous substances such as orris root, house dust, horse serum, etc. The tests, of course, may reveal a sensitivity of which the patient has no knowledge of a reaction.

Prausnitz and Kustner have described a method of passive transfer by injecting into a normal nonallergic person a drop or two of defibrinated, centrifuged and Berkefeld sterilized blood from the sensitive individual. This is done intradermally and the site of injection or transfer is tested by skin tests. This site will react to the atopen to which the allergic person was sensitive. No other site on the transferee will show this reaction. Mucous membrane tests are described, both ophthalmic and intranasal. Blood tests for calcium, phosphorus, sugar and, especially, eosinophilia are done. A basal metabolism is often done routinely.

TREATMENT.—In the *perennial type*, G. T. Brown (*Ibid*) employs ephedrine solutions, oily preparations and antiseptics as *palliative treatment*. Often, local applications do more harm than good. Operative procedures in this type of nose are, as a rule, contraindicated.

Curative treatment is accomplished by the usual methods of avoiding the offenders and desensitization. Often, perennial hay-fever is one of the most maltreated conditions in medicine.

Treatment of the *seasonal type* is divided by Brown (J. M. Soc. New Jersey 29 483 (June) 1932) into 3 methods, the preseasonal, coseasonal and, more lately, perennial. Pollen extract made in the manner peculiar to the operator is given in ascending doses and desensitization accomplished. It is often found of great benefit to use a "stock vaccine" coincidentally with the pollen inoculations in some refractory cases. Palliative treatment may be given in the form of ephedrine preparations locally to the mucous membrane and also by mouth. The adult dose is $\frac{3}{8}$ to $\frac{3}{4}$ grain (0.024 to 0.048 Gm.) either by capsule or aqueous solution, and for children, $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.016 to 0.032 Gm.), preferably by solution.

S. S. Bullen, W. Francis and J. M. Parker (J. Allergy 3 485 (July) 1932) call attention to the fact that in the past several years a large amount of ephedrine has been used in upper respiratory conditions and also in eye cases. The usual undesirable actions of the drug are familiar—palpitation and tremor often marked, along with nausea and insomnia. The author reports 2 cases of an erythematous rash due to the taking of ephedrine and cites other cases in the literature since 1929.

A hay-fever patient of the fall type, sensitive to ragweed, was not desensitized. Previous to the use of ephedrine drops in her nose, she had used a menthol ointment with no deleterious effects. After using the drops, the patient was covered with a scarlatiniform rash over most of the body, swollen eyelids, accompanied by intense itching. She had

also taken some ephedrine by mouth. Contact tests were positive and the condition cleared up immediately on avoidance of the drug.

The other case was analogous to the one just described and relief followed elimination of the drug. The "contact test" is an excellent and safe method of testing these cases.

A case of urinary retention due to ephedrine is cited by R. M. Balyeat and H. J. Rinkel (J. A. M. A. 98:1545 (Apr. 30) 1932). In taking ephedrine, especially in large doses, patients sometimes complain of little or no desire to pass urine. An excellent schematic diagram of the vegetative nerve supply to the bladder, trigone and sphincter is furnished by the authors. The sympathetic is the inhibitory nerve of the bladder muscle and activator of the trigone and sphincter and the parasympathetic *vice versa*. The continued use, therefore, of ephedrine would have a tendency to relax the bladder wall and contract the sphincter, thereby giving urinary retention.

In the case of a man aged 58 years, nasal applications of ephedrine were given as well as 25 mg ($\frac{3}{8}$ grain) daily by mouth. In 4 weeks urinary retention was encountered and he had to be catheterized daily. Constipation was also a symptom. After eliminating the ephedrine the patient was free of retention in 36 hours. The same symptoms returned, however, when ephedrine was again used. These symptoms are more common in patients near or over 60 years, but cases have also been observed in children. In using ephedrine, especially in older patients, careful attention should be given to any signs of urinary or bowel trouble.

H. B. Wilmer and H. M. Cobe (J. Allergy 3:442 (July) 1932) call atten-

tion to the fact that the pollen content of the air is one of the determining factors in the severity of symptoms in hay-fever. There are other factors that affect the patient, some climatic in origin. They affect him in that the number of pollen grains in the air that come in contact with the mucous membrane is diminished or increased by such things as rain-fall, wind velocity, etc. These same conditions also play an important rôle in the growth, virulence and toxicity of the pollen. This led these 2 investigators into the study of how to produce a pollen that comes to the laboratory for extraction without having been subjected to any untoward influences, i. e., a pollen grown under ideal conditions, a material for testing and treatment that has not been altered by the caprices of soil, sun, rain and wind.

Ragweed plants were planted in a greenhouse and grown essentially the same as field plants, except that they were protected from storms, heavy winds, and subsoil irrigation was employed. No extraneous condition or natural impediments influenced the growth of these plants. This pollen when collected was in every way as pure as could possibly be supplied and the comparison with 5 other pollen specimens, after plating on Sabouraud's maltose agar medium, was very striking. Results follow: The bacterial counts in the 5 other specimens ranged from 56 to 19,000. The bacterial count in the hothouse pollen (Dixon) was 32. Mold content of the Dixon or hot house pollen was *nil*. All other samples contained varying amounts of molds.

The difference in the reagenic activity of this pollen as compared with the others was just as striking. The commercial pollen reactions were all prac-

tically the same, except for one specimen of the vintage of 1926, which gave only a very slight reaction in all tests made. The greenhouse pollen gave consistently larger wheals, the response occurred sooner and persisted longer. The toxicity and potency must be greater and it is very evident that pollen becomes less potent from year to year. It is only logical to surmise that better results will be obtained in the future, both in testing and treatment, from pollen grown under regulated conditions.

A Brown (*Ibid* 3 113 (Jan) 1932) deals with the treatment of hay-fever by the perennial method. Under the present system of treatment, when the season is over, whatever tolerance a patient has built up is lost to a certain degree. This makes it necessary to begin the treatment where it was begun the year previously. The author enumerates all precautions to be taken in this method and tabulates his cases of hay-fever treated by the perennial method, showing good results. He also states that, although the degree of sensitivity influences the amount of extract given, treatment must be contingent on personal experience with the patient. It is very true that classification is a guide, treatment is individual.

The advantages of the perennial treatment are as follows. Treatment may be begun at any time during the year, the office visits are fewer in number, there is less chance of interruption by illness, and it eliminates the seasonal characteristics in the physician's office.

An improved method of coseasonal treatment is described by W. T. Vaughan (*Ibid* 3 542 (Sept) 1932). When hay-fever therapy was in its infancy, the doses of pollen extract were abruptly terminated at the beginning of the season—it was thought dangerous to

continue injections through the season. Knowledge of dilutions and clinical reactions has increased and with it a more accurate form of treatment and dosage.

Coseasonal ragweed cases were started on a dose of 10 to 20 pollen units given daily. If marked improvement was not noted after several treatments, the dose was increased by 20 units a dose. When relief was obtained, the interval between doses was gradually increased from 1 to 2 days and upward. At the beginning of the treatment, the usual precautions, as to sensitivity and initial dose, were taken. Adequate relief in most cases was achieved with a top dose of 80 units. There is no antibody exhaustion as is believed in preseasonal treatment but often seems to be disproved.

Preseasonal treatment is the method commonly used. If in the future results in coseasonal treatment are as gratifying as have been the cases of the author, coseasonal treatment may become as successful as perennial and pre-seasonal. It is always a question whether the added inconvenience of the perennial method does not justify its elimination.

MIGRAINE.—In a series of allergic migraine cases, R. M. Balyeat and H. J. Rinkel (*Ann Int Med* 5 713 (Dec) 1931) observed that 85.4 per cent had a family history of allergy. Many asthmatic patients also suffer with migraine. In true migraine almost all have a specific sensitization to some protein. It is necessary in all of these cases to eliminate any organic brain lesion. As in other allergic conditions, migraine occurs more commonly in those patients who have a highly active nervous system. It is more common in the professional and business man than in the laboring class.

Many other allergic conditions are often associated with migraine, both from the standpoint of the family history and from the patient's own syndrome, such as asthma, hay-fever urticaria, eczema and even epilepsy. It is believed that all patients with epileptic seizures who have a family history of migraine should be studied for any food sensitivity as the possible cause of epilepsy. Several conditions have been mentioned as predisposing factors in migraine, physical and mental fatigue, toxic conditions, thyroid dysfunction, genitosexual disturbances as well as those of the special senses.

Tests are routinely done, both scratch and intradermal. The chief offenders in order of importance were milk, wheat, eggs, nuts, beans and fish.

Treatment consists in first eliminating the predisposing factors and then the exciting factors. After this has been accomplished as far as possible, it is necessary to then treat the attacks as they occur. This latter procedure in itself is often done with very discouraging results. Many drugs are used but few give any benefit. General measures such as starvation, restriction of food and elimination must be well carried out. Often salines are given with the thought in mind that the process is an edema of the brain and meninges.

HEADACHE—H. J. Rinkel and R. M. Balyeat (J. A. M. A. 99:806 (Sept 3) 1932) also describe the symptomatology, the prodromata and pathology of headaches due to specific sensitivity. The family history is most important. The symptoms are variable and diverse. The usual diagnostic aids are of little value in headaches of this type which are similar to those of migraine of the hereditary type.

CONJUNCTIVITIS.—There are several theories of the cause of vernal conjunctivitis, according to L. Lehrfield (Arch. Ophth. 8:380 (Sept) 1932), but in this section a special interest is, of course, added in that it is an ocular manifestation of an allergy. It is, more than likely, an allergic disease caused by dust, animal danders and pollens. Itching, redness of the eyes, lacrimation and a thick, ropy discharge are the symptoms. It is necessary to differentiate this condition from acute catarrhal conjunctivitis, "pink eye," and trachoma.

A comparative study of the relative merits of the scratch and the intradermal methods of skin testing was made. There were, as usual in allergic diseases, more reactions by the intradermal procedure. A group of patients were tested and results were definite enough to make the author feel that the cause of the disease does not remain unknown and that this is truly an allergic condition. Ten per cent of the patients gave a history of other allergic manifestations, while 21 per cent. gave a history of allergy in the family.

Methods of testing are being improved from day to day. The rapid strides made in late years in this procedure and also in the refinements of extracts have changed very definitely the trend of thought as to the etiology of vernal conjunctivitis. It may be possible that a more delicate biologic test is needed to finally clarify the situation.

EPISCLERITIS.—A case of episcleritis is reported by R. M. Balyeat and H. J. Rinkel (J. A. M. A. 98:2054 (June 11) 1932) in a physician, aged 37. The condition had been present for 10 years and the attacks were characterized by photophobia, lacrimation and

pain Each attack lasted from a week to 14 days A previous diagnosis of episcleritis of unknown origin was made In taking his history, it was found that between attacks the patient suffered with the fall type of hay-fever

When seen by the authors he was tested and found sensitive to ragweed and 2 other plants At that time, he was not tested for foods One year later, the tests were repeated At this time, he again reacted to the ragweeds, other pollens and the feathers He also had marked reactions to a number of foods Both years he was desensitized for his hay-fever with fair results the first year and nearly 100 per cent the second Foods to which he was sensitive were removed from the diet.

Since the above treatment has been instituted, the patient has not suffered from episcleritis except on one occasion and, at that time, he deliberately ate some of the foods previously eliminated from his diet When again asked to eat these foods, he declined It seems within the realms of justification to classify this as an episcleritis due to allergy

SKIN DISEASES.—M B Sulzberger, W C Spain, F. Sammis and H I Shahan (J Allergy 3 423 (July) 1932) call attention to the use of the term "*eczema*" It is in most instances used promiscuously for any not too well defined or atypical skin eruption If used and not abused, the author would not have advocated its being dropped from the terminology of the medical profession There are so many atypical and non distinguishable skin conditions that even the trained dermatologist is puzzled

Eczema is used to designate any condition showing the following characteristics a condition due to contact irri-

tants, usually nonprotein in origin, erythema is present, papules, scaling and vesiculation are noted This is the European conception For allergic eczema, the term neurodermatitis has been coined, evolving into the name of *neurodermatitis disseminatus* This type of condition should not be confused with the form previously mentioned A differentiating chart is available in this article

DIFFERENTIAL DIAGNOSIS.—To differentiate eczema of the contact type and neurodermatitis, the following factors must be taken into consideration In eczema, family history, other allergies and childhood eczema are usually negative All of these are usually positive in neurodermatitis In true eczema the age of onset is variable, in neurodermatitis it is before 20 years of age In the former, the direct and indirect tests are usually negative and the patch test positive, with eczematous reactions to one or more contact irritants In neurodermatitis, the patch test is usually negative The direct tests show many positive wheals and the indirect less in number Food, inhalants, etc, are usually the exciting factors in the latter and in true eczema, chemicals of unknown formulæ without protein

TREATMENT.—J M Markin (New York State J Med 32 390 (Apr 1) 1932) applies the propeptan therapy of Luthlen-Urbach to the treatment of allergic skin diseases caused by the foods In the treatment of conditions due to food sensitivity, 2 methods have been applied (1) giving small ascending doses of the food, and (2) taking of small quantities of the food to be eaten 1 hour before the regular meal Luthlen was the first to work with peptones which had been derived from the food proteins to which

the patient had a sensitivity. After his death this work was continued by Urbach.

The cases in this report were hospitalized and placed on a low protein diet and daily some protein was added until their symptoms returned. The elimination diets of Rowe were also used for diagnosis.

Another way of testing is the method of Urbach, *ie*, to feed the patient propeptans, $1\frac{1}{2}$ - to 3-grain (0.1 to 0.2 Gm) doses, three-quarters of an hour before the ingestion of a particular food. This is done for all foods eaten and gradually the propeptans are removed from the diet. When the objective and subjective signs of the patient return, this is assumed to be the offending food. The patient is again placed on this propeptan and tested for others.

One of the latest propeptans to be used was that of horse meat. A child in a poor family, after the routine testing, was found to be sensitive to sausage. After giving the patient all the propeptans of the ingredients of sausage, the child had no relief. The propeptan of horse meat was given and the condition cleared up immediately.

The method of *treatment* in these cases is as follows: three-quarters of an hour before the regular meal, the corresponding propeptan of the specific food to which the patient is sensitive is given. The dosage is from $1\frac{1}{2}$ to 3 grains (0.1 to 0.2 Gm) per protein. There should be at least 4 hours between meals. In severe cases and those that are refractory it may be necessary to give 3 or 4 tablets ($1\frac{1}{2}$ grains—0.1 Gm—each). It has been found that 2 or 3 weeks are usually necessary for desensitization.

PHYSICAL ALLERGY—G. W. Bray (J. Allergy 3:367 (May) 1932)

describes a very interesting case of physical allergy. A boy, $8\frac{1}{2}$ years of age, complained of severe itching of the hands when placed in cold water. They became very pink and swollen and at times caused him pain. They were often twice their normal size and later became stiff. The night following his exposure he would cough considerably and a cold often followed. There was a very definite history of allergy in the family.

A very instructive laboratory procedure was carried out. One hand was immersed in cold water and the other not. A blood count previously taken showed a 2 per cent eosinophilia in both hands. After exposure, the hand immersed had a 4 per cent eosinophilia and in the other hand no eosinophiles were present.

The patient was desensitized by histamine, ascending doses being given until he had had 25 in 27 days and a total amount of 16.2 mg. ($\frac{1}{4}$ grain) of the substance. A general reaction was noted after the injection of the material, *ie*, redness of the face and ears, and with larger doses a marked shivering and faintness. There was a drop in blood-pressure, increase in pulse rate and a rather intense headache. This usually lasted for 20 minutes.

After treatment, the patient could immerse his hand in cold water for 5 minutes with only a mild urticaria resulting. Previously, in winter his life, at times, was almost unbearable due to the discomfort, but following desensitization he had very marked relief. These patients are usually subject to only one physical force, such as cold or heat, but not both.

W. W. Duke (*Ibid.* 3:408 (May) 1932), in treating cases of physical allergy, shows that this condition may

be exactly like those caused by food, pollen and other proteins, and may have identically the same symptoms as angio-neurotic edema, urticaria, coryza and asthma itself. He finds that in the treatment of these cases methods are fairly successful in some instances but spectacular in others.

Cases *sensitive to heat* are treated by ascending applications of heat to the body to the point of reproducing whatever symptoms the patient complained of, the incandescent lamp being used.

Cold sensitive patients are treated in the same manner as the heat cases, using ice to produce cold. It is easier to avoid overcooling than overheating. Effort in a cold case often gives relief, in a heat case it makes the symptoms worse.

Of course, if it is at all possible to avoid the agents causing the reaction, this is the method of choice. Dry air in either case makes the patient less sensitive than a humid atmosphere. These patients often are afflicted mentally with phobias on the realization of their weakness. Confidence is restored when they learn that they can be exposed to these conditions without having disagreeable and oftentimes dangerous attacks.

AMBLYOPIA.—Treatment.—Special classes for patients with amblyopic eyes and routine ocular examinations to detect and correct subnormal visual acuity in school children are advocated by M. Casteran (Arch d'opht 49 100 (Feb) 1932). He reports that a school for training amblyopic eyes is now operating successfully at Strasbourg.

AMBLYOPIA EX ANOPSIA.—Treatment.—According to L. C. Peter (Am J Ophth 15 493 (June) 1932),

cases of *amblyopia ex anopsia* may be classified in 3 groups, *i e*, (1) amblyopia in monolateral eso- or exotropia, (2) amblyopia in adolescence and in adult life associated with a history of squint in early childhood, (3) amblyopia without a history of squint. He concludes that amblyopia in each group, from a visual field standpoint, has the same characteristics. The amblyopias which are observed in adults are really acquired in early childhood and undergo little change throughout life. All have these features in common: (1) an hereditary tendency to squint, (2) an hyperopic error with anisometropia, (3) a subnormal fusion faculty; (4) a central scotoma, (5) an enlargement of the blind spot, and (6) a contraction of the peripheral fields for form and color. He states that treatment, if instituted before the fifth year, prevents the development of amblyopia and restores normal vision. Fusion is always present but defective. Peter advocates early operation and systematic training of squint cases in the first 5 years of life to prevent or correct loss of macular vision.

D. W. Wells (*Ibid*, 15 508 (June) 1932) recommends a bar reading device to compel binocular use of the eyes for reading in cases which show a tendency toward suppression of the image in one eye. During reading this device may be so held in the hand or attached to a head band between the eyes and the reading material that each eye must be used at least part of the time for every line read. To obtain the best results this method should be used for all close work.

TOXIC AMBLYOPIA—A case of amblyopia which developed following the ingestion of 8 four-gram doses (1 ounce) of ethylhydrocupreine adminis-

tered in milk was reported by C M Swab (Arch Ophth 7 285 (Feb) 1932). Central vision, which was at first reduced to light perception, returned to normal and while the green and red fields remained much contracted, the field for blue gradually returned. Swab believes that this was probably a case of idiosyncrasy.

AMEBIASIS.—Amebiasis, as it relates to the public health in this country, is a problem of increasing importance which is not as yet thoroughly understood by the medical profession at large, according to C. F. Craig (J A M A 98 1615 (May 7) 1932). While, in 1911, Sistrunk reported an analysis of 145 patients, 25 being infected with *Endameba histolytica*, of which 12 had never resided outside of the Northwestern States, his paper was not given the attention it warranted. Other papers, likewise, were disregarded and it was only during the last decade that the question of the prevalence of infection with *Endameba histolytica* and its effect on the public health has been taken up.

Craig states that there is an amebiasis problem in this country which may be handled from the standpoint of prophylaxis.

NATURE OF AMEBIASIS.—By amebiasis, Craig refers to all infections of man with *Endameba histolytica* without regard to the presence or absence of symptoms of such infection. Heretofore, terms such as amebiasis and amebic dysentery have been regarded as synonymous by most of the writers, and it is surprising to see in some of the more recent publications the entire subject referred to under the heading amebic dysentery. This conception, according to Craig, is obsolete, and until

the profession understands that amebic dysentery is simply one stage of amebiasis, little can be hoped for from the standpoint of prophylaxis and therapy. While the majority of serious cases of infection with *Endameba histolytica* have dysenteric symptoms, the vast majority of such infections are not accompanied by other than mild findings usually attributed to some other factor and not recognized as the result of infection with this parasite.

The Committee on Nomenclature of the American Society of Tropical Medicine recommended that the following terms be used under the general heading "amebiasis." Amebic dysentery; amebic enteritis, amebic abscess of the liver; amebic hepatitis; and amebic carrier-state.

INCIDENCE OF INFECTION.—Incidence varies greatly in different localities. An incidence as low as 0.2 per cent has been reported in 522 patients studied by Andrews and Paulson, in Baltimore, and as high as 53.2 per cent. in 154 students at the University of California.

In 1923, Boeck and Stiles examined 8029 people of whom 333, or 4.1 per cent., were infected with *Endameba histolytica*. In 1926, Wight examined 1341 individuals and found 92 infections, or 6.8 per cent. In 1930, Faust, found 92 of 460 individuals, or 20 per cent, in Virginia, infected with *Endameba histolytica*. In New Orleans, Faust examined 1100 patients and found about 13.7 per cent. infected. In the Charity Hospital, at New Orleans, 27.2 per cent of infections were found in the male medical ward, and 13.1 per cent. in the female medical ward, 25.2 per cent. in the obstetrical ward, 8.27 per cent. in medical students, and 9.05 per cent. in private pay patients.

Craig concludes that it is conservative to estimate that from 5 to 10 per cent of the people in the United States harbor *Endameba histolytica*. With a population of 120,000,000, this means that between 6,000,000 and 12,000,000 people are infected. From an extremely conservative estimate, the evidence is certainly sufficient to warrant the statement that 1 per cent of the population or 1,200,000 are harboring *Endameba histolytica*, and from the standpoint of incidence of a parasite alone, amebiasis is a problem worthy of consideration.

PATHOGENICITY.—The question at issue is whether *Endameba histolytica* actually does invade the intestinal tissue and cause lesions and symptomatology in 5 to 10 per cent of the population that are infected, or whether it lives in the lumen of the bowel as a harmless commensal in the majority of these persons.

It is an established fact that this organism is essentially a tissue parasite and that there can be no infection with this parasite without the production of pathologic lesions, however minute such lesions may be. The organism cytolyses intestinal epithelium and by ameboid motility penetrates the intestinal tissues. Whether symptoms develop depends, in all probability, on the natural resistance of the individual. The majority of carriers are so resistant that the minute lesions produced by the amebas are healed almost as rapidly as they are produced. If the patient's resistance, however, is lowered by overwork, poor food, the enervating effect of a tropical climate, improper diet, repeated exposure to massive infections, or other stress or strain, symptoms of diarrhea or dysentery will develop after a variable period.

Experimentally, there is no evidence

that the parasite can live for an extended period in animals without producing pathological lesions.

Craig states that approximately 30 to 50 per cent of carriers present symptoms, although he does not admit that there is a definite clinical picture associated with infection in carriers, although certain symptoms are frequently found connected with the gastrointestinal or nervous symptoms.

This writer does not believe that the avirulent species of amebas described by Brumpt under the names *Entameba dispar* and *Entameba hartmanni* differ from *Endameba histolytica*, and points out that kittens inoculated with such amebas developed the same dysenteric symptoms and showed the same pathological lesions as those inoculated with typical *Endameba histolytica*.

MEASURES OF CONTROL.—The measures thought to be of the greatest practical value are the recognition and treatment of the infection occurring in the general routine of medical practice. Examination of the feces of food handlers in institutions, hospitals, hotels, restaurants and all places where food is served to the public, followed by the treatment of those who are found infected, is of primary importance. Education of the public to the prevalence and method of transmission, danger to health of infection with this parasite, together with simple rules of personal hygiene for prevention of spreading, are of fundamental importance.

DIAGNOSIS.—Clinical symptoms alone will not lead to the diagnosis of infection with *Endameba histolytica*. Even when acute dysentery is present, the diagnosis must be confirmed by the demonstration of the parasite in the feces. Craig states that a diagnosis

based on anything less than the finding of the parasite in the feces or in material obtained by the proctoscope is worthless

While the education of the public will curb home infection to a large degree, only the discovery and proper treatment of carriers through public food handlers will result in any great decrease in the incidence of infection of this parasite

AMENORRHEA. — TREATMENT—R Kurzrok and S Ratner (Am J Obst and Gynec 23 689 (May) 1932) treated patients with amenorrhea with hormonal products but rarely found an improvement in those cases which were accompanied by some degree of genital hypoplasia. Treatment consisted of the injection of 1 c.c. (16 minims) of sistomensin once or twice a week, and the administration by mouth of 6 c.c. (1½ drams) per day of a raw extract of the whole ovary, as well as 6 c.c. (1½ drams) per day of a raw extract of anterior pituitary gland. In addition, almost all the patients received a weekly intramuscular injection of 10 to 20 c.c. (2½ to 5 drams) of blood taken from patients in the last half of pregnancy.

AMETROPIA.—From a study of more than 8000 cases of refraction, E Jackson (J. A. M. A 98 132 (Jan. 9) 1932) concludes that myopia is rare in childhood, and that the average amount tends to increase especially after the age of 20 years, hyperopia decreases in amount up to the age of 20, after which there is a slow increase up to old age

ETIOLOGY.—O Huber (Klin Monatsbl f Augenh 88·230 (Feb.) 1932) reports 3 cases in which a diminution of the refractive error followed *trauma*. The right eye of a boy struck by a chestnut changed from myopia of

2 diopters to emmetropia. A myopia of 2.75 D was reduced to a half diopter of hypermetropia which has persisted for 3 years without change. Another case also showed a reduction in the total error of refraction following an injury

From his investigation of *hereditary factors* in errors of refraction, F Wibaut (Arch f Augenh 105 209, 1932) concludes that astigmatism in a child is the result of inheriting the astigmatism of the parents or it is due to a marked difference between the refractive indexes of the corneas of the parents. He believes that hyperopia in children need not be more fully corrected than the symptoms require and that near work should be controlled to prevent the development of myopia.

ANALGESIA, DRUGS PRODUCING.—In a clinical comparison of *acetylsalicylic acid* analgesia with and without *magnesium oxide*, F. A. Simon (J. Lab. and Clin. Med. 16:1004 (Aug) 1931) found that the combination of acetylsalicylic acid and magnesium oxide gave significant relief more frequently than larger amounts of aspirin alone. In the 45 patients studied complete relief was afforded more than twice as often by the combination as by the single drug. It appears true for many individuals that the addition of magnesium oxide reduces the amount of acetylsalicylic acid necessary to produce a given degree of analgesia.

Symptoms of gastric irritation following the oral administration of acetylsalicylic acid are practically eliminated by the addition of alkalis. Magnesium oxide has proved to be the most efficacious drug to combine with the salicylates for this purpose. Bicarbonate of soda also enjoys a reputation in this respect and is preferred by some.

FREQUENCY DISTRIBUTION OF VARIOUS DEGREES OF RELIEF FROM PAIN IN 45 PATIENTS TREATED WITH ACETYLSALICYLIC ACID AND IN THE SAME PATIENTS TREATED WITH ACETYLSALICYLIC ACID PLUS MAGNESIUM OXIDE

Dose	Acetylsalicylic Acid			Acetylsalicylic Acid Plus Magnesium Oxide			
	10 Grains	15 Grains	20 Grains	6½ Grains of Each	10 Grains of Each	13½ Grains of Each	20 Grains of Each
Number of courses of treatment	76	22	11	43	48	14	9
No relief or very slight relief	48%	60%	36%	37%	50%	43%	56%
Moderate relief	25%	23%	36%	37%	12%	50%	22%
Very much relief	24%	18%	27%	19%	33%	7%	0
Complete relief	3%	0	0	7%	4%	0	22%

ANEMIA.—The presence of an anemia may be surmised, but no clinician should diagnose or treat a case of anemia without adequate knowledge of the blood, nor evaluate the method of treatment without standards of comparison.

The importance of a complete and accurate blood count is emphasized by R L Haden (J Lab and Clin Med 17 843 (June) 1932). He states that the usual routine red and white blood count, hemoglobin determination and differential count is merely the starting point in the study of a case of anemia. He believes the following should be done in addition to those mentioned above: determination of the mass of packed corpuscles, calculation of the volume index and saturation index, platelet and reticulocyte count, and determination of bile pigment content of the plasma.

Davidson adds to the above list: test meal, examination of the urine for bile, urobilin, blood, albumin and casts, repeated examination of feces for occult blood, fragility test, and x-ray of the gastrointestinal tract when indicated.

Both of the above-mentioned writers prefer to use an oxalated specimen of

venous blood in their examinations to insure uniform results.

Haden's technic consists of the withdrawal of 20 cc of blood by means of the usual syringe. Exactly 10 cc of the blood is run into a 12- or 15-cc centrifuge tube, containing exactly 2 cc of 14 per cent sodium oxalate solution. This is mixed by inverting and centrifuged 1 hour at 2500 revolutions per minute. The remainder of the blood, withdrawn from the vein, is added to an ounce bottle containing 1 drop of a 30 per cent solution of potassium oxalate, this specimen being used for the red and white cell count and for the hemoglobin determination.

The centrifuge tube is calibrated so that the volume of packed cells may be read directly.

In order not to introduce error, Haden warns against the use of pipettes and counting chambers not certified by U S Bureau of Standards and a hypotonic diluting solution, he himself preferring 0.9 per cent sodium chloride diluting solution.

The estimation of hemoglobin is simply and easily done if a hemoglobino-meter reading directly in grams is used, the Haden-Hausser being the one preferred by the writer.

With the above methods, enough information is gained to calculate the indices as follows:

(a) The volume index (volume of average cell relative to normal)

(b) The color index (amount of hemoglobin per cell relative to normal)

(c) Saturation index (amount of hemoglobin per unit volume of cell relative to normal)

A monogram may be easily constructed to facilitate the calculation of these indices

In determining the *coagulation time* of the blood, Haden also believes the Lee-White method to be the most satisfactory and accurate, and it is simple. Blood is taken from the vein with a syringe which has the space between the plunger and needle filled with saline solution. One cc of blood is run into each of 3 absolutely clean Wassermann tubes 8 mm in diameter which have been just previously wet with saline solution. After standing 3 minutes, the tubes are rotated endwise every 30 seconds. The end point is taken when the tube may be inverted without the blood surface losing its contour, usually between 5 and 8 minutes.

Using the above information, Haden suggests the following

LABORATORY CLASSIFICATION which is based on variation in number, size and hemoglobin content

Number	{	Hypercythemic	red count greater than normal
		Normocythemic	red count within normal limits
		Hypocythemic	red count less than normal
Volume	{	Macrocytic	mean corpuscular volume greater than normal.
		Normocytic	mean corpuscular volume normal
		Microcytic	mean corpuscular volume less than normal.
Hemoglobin content	{	Hyperchromic	mean corpuscular hemoglobin greater than normal
		Normochromic	mean corpuscular hemoglobin normal.
		Hypochromic	mean corpuscular hemoglobin less than normal.

The different descriptive combinations are:

Normocythemic	{	Normocytic and hypochromic
		Microcytic and hypochromic
Hypercythemic	{	Normocytic and hypochromic.
		Microcytic and hypochromic
Hypocythemic	{	Macrocytic and hyperchromic.
		Macrocytic and normochromic.
		Macrocytic and hypochromic
		Normocytic and normochromic
		Normocytic and hypochromic
	{	Microcytic and hypochromic

Every anemia should be thought of in terms of number, volume and hemoglobin content of the average erythrocyte and classified on such a basis, thereby dispensing with the useless words "primary" and "secondary" in the description of an anemia.

Another classification is suggested by L S P Davidson (Edinburgh Med J 39 105 (July), 137 (Aug) 1932) in which he divides the anemias into 4 groups.

I NUTRITIONAL DEFICIENCY ANEMIAS

1 Due to defective production or faulty assimilation of the specific antianemic material found in the liver

1 Primary macrocytic hyperchromic anemia, i.e., pernicious anemia

2 Secondary macrocytic hyperchromic anemia, i.e., sprue, koilonychia, multiple anastomoses, gastrectomy, pernicious anemia of pregnancy (increased demand, i.e., relative insufficiency), dysentery, etc.*

* Many cases of the diseases in Group A, 2 have a failure in iron assimilation and thus pass into Group B, 2

B Due to defective absorption and assimilation or reduced intake of the factors necessary for hemoglobin formation

- 1 Primary microcytic hypochromic anemia (simple achlorhydric anemia and the Plummer Vinson syndrome)
- 2 Secondary microcytic hypochromic anemia due to starvation, insufficient or defective dietary, *e g*, low protein and green vegetable, high carbohydrate diet, milk diet in peptic ulcer, in infants, and in experimental anemia of rats, inflammation and catarrh of the stomach and intestines (*vide A, 2*)

II POSTHEMORRHAGIC ANEMIA

Acute or chronic including blood loss into the gastrointestinal, urogenital, and respiratory tracts

III HEMOLYTIC ANEMIAS

- 1 From acute, sudden and severe hemolysis with hemoglobinemia and hemoglobinuria, *e g*, malaria and blackwater fever, paroxysmal hemoglobinuria, hemolytic streptococcal septicemia, hemolytic poisons, such as toluylendiamine, snake venom, etc
- 2 From steady, incessant hemolysis associated with excessive activity of the reticulo-endothelial system, leading to icterus and splenomegaly
 - (a) Congenital acholuric jaundice and sickle cell anemia
 - (b) Acquired hemolytic jaundice
 - i Causal factor unknown The condition resembles clinically the congenital type, but fragility is less marked or absent
 - ii Associated with profound dyscrasia of the hematopoietic and reticulo-endothelial system, *e g*, certain cases of Hodgkin's disease and obscure affection of the liver and spleen.

IV ANEMIAS DUE TO DEPRESSION OF BONE-MARROW FUNCTION

- A* Idiopathic aplastic anemia and idiopathic agranulocytic angina
- B* Aplastic or partially aplastic anemias secondary to radioactive substances, benzol poisoning, toxemias and septicemias, cachectic states, cirrhosis of

liver and spleen, metabolic diseases (nephritis), and metallic poisons such as lead and mercury

Davidson states that a classification of anemias is beset with great difficulty, since any given case may be the result of two or more factors He, like Haden, prefers not to use the words "primary" or "secondary," but endeavors to describe the process on an etiological foundation

ETIOLOGY—This varies, as the above classification indicates, according to the type of anemia under consideration but, like Castle, Davidson (*Ibid*) believes that the process of maturation is controlled by a substance in the nature of a hormone, which is manufactured in the stomach from protein and stored in various tissues of the body, from which the active principle may be extracted by use of proper methods The nature of this hormone is not known and T Tempka and Braun (*Polska gaz lek* 11 41 (Jan 17) 1932) state the cause rests in "reduced resistance of the erythrocyte on some chemical basis," but it was impossible to conclude from their experiments whether the substance capable of restoring normal erythropoiesis was a hormone, a vitamine, or a chemical substance

M B Strauss and Wm B Castle (*New England J Med* 207 55 (July 14) 1932) report results of experiments demonstrating that *Addisonian pernicious anemia* is a deficiency disease, conditioned by the lack of a specific intrinsic factor present in normal gastric juice but absent in the case of pernicious anemia This factor is defined as a heat-labile substance with properties unlike hydrochloric acid, pepsin, rennin or lipase, which act upon an extrinsic factor found in washed proteins of beef muscle precipitated at pH 6, but not in

washed casein or wheat gluten, and described as "a protein or a closely related substance" Other facts about this extrinsic factor are It has definite hematopoietic effects upon interaction with normal human gastric juice, it is not present in washed nucleoprotein from hens' blood, in animal nucleic acid, or in yeast nucleic acid It is present in autolyzed yeast about 20 times the concentration that is found in beef muscle protein, freed of fat, carbohydrate and fat soluble substances Autoclaving this extrinsic factor for 5 hours at 15 lbs pressure does not destroy it (This destroys vitamin B) It can be extracted from yeast protein with 80 per cent alcohol Its presence in beef spleen is not demonstrable at all times

Castle and Strauss (*Ibid*) further state that, in general, the characteristics and distribution resemble those of vitamin B₂, but as no single source of vitamin B₂ is available and the identity of B₂ is unknown, it only leaves the interaction of this extrinsic factor with gastric juice an "attractive working hypothesis" In their conclusion Strauss and Castle cite the possible analogy of vitamin B₂ bearing the same relationship to hematopoiesis that vitamin B₁ bears to disease of the central nervous system

As a result of Castle and Strauss' observations, along with those of Whipple, Minot, Landau and Glass, 2 observers cooperated to identify this missing factor

Interesting observations were made from a study of the possible relationship of pancreatic insufficiency to *Adison-Biermer* (*pernicious*) *anemia*, by G Cheney and F Niemand (*Arch Int. Med* 49:925 (June) 1932) who conclude that the protein derivative deficiency is due to a lack of both peptic and

tryptic digestion and that "trypsin represents the unknown intrinsic factor"

A Holst (*Ztschr f Hyg u Infektionskr* 112 646, 1931) reports the finding of a "specific agent," which, when inoculated into prepared blood medium, produced the characteristic hemoglobin change of pernicious anemia, this change being detected by means of the spectroscope Attempts to convey the disease from this inoculated blood medium to monkeys have failed Facts concerning it are meager, but it is known to pass through an L3 filter and in one case passed through an L7 filter It is suggested that this may be the agent responsible for certain morphological appearances of the red cells

In considering the constitutional factor in diseases of the blood, L. J Witts (*Practitioner* 129 450 (Oct) 1932) pertinently points out that heredity and environment are nearly always cited as playing a part in a disease, but in no disease are they more important than in those of the blood He suggests that morbid tendencies may not appear as morbid pathology until late in life or until some unusual strain is placed on an economy. He cites hemophilia as being "inherited as a sex-linked recessive" In mentioning hereditary multiple telangiectasia, he refers to the disease being "inherited as a Mendelian dominant" He states that the condition known as "hereditary purpura hemorrhagica" or "thrombasthenia" has been suggested as being "transmitted as a sex-linked dominant."

Another group of congenital dystrophies affecting the erythrocytes, such as acholuric jaundice or splenocytosis, sickle cell anemia or drepanocytosis and the rare ovalocytosis, are thought by Witts to be fundamentally due to hereditary abnormalities, and are inherited as

Mendelian dominants. He further states that pure hereditary diseases are uncommon in clinical medicine, but disease is very frequently the result of the interplay of environmental factors and a latent hereditary weakness. He throws side light on the problem by recalling to mind that many are subjected to the same strain but only the susceptible break down. He cites as examples the occurrence of simple achlorhydric anemia after gastroenterostomy; the more frequent appearance in women of post-operative microcytic anemia after gastroenterostomy, although more men are operated upon, the tall, wiry, robust donors standing blood loss better than the short donor, or the tall and fat donor.

From an examination of over 200 patients and a study of the literature, E. E. Osgood and H. D. Harkins (Ann Int Med 5 1367 (May) 1932) state that there are, obviously, 3 fundamental causes of anemia.

1 DEFICIENT PRODUCTION OF RED CELLS, which, in turn, is dependent (1) upon a lack of erythrocyte-building material, such as iron, other metals and other unidentified substances necessary in the production of hemoglobin. The lack of these materials probably leads to a low color index and a more severe deficiency leads to a low saturation index. A lack of stroma-building material might lead to a low volume index, or this, in turn, may be secondary to a decreased supply of hemoglobin.

The deficient production of red cells may be due (2) to aplasia of erythropoietic tissue. In this case, absence of evidence of erythrocyte regeneration is expected, such as reticulocytes, polychromatic cells, and nucleated red cells, and, as the other myelogenous elements are usually affected, leukopenia could be

expected, thrombopenia with associated bleeding time, delayed clot retraction and a tendency to hemorrhage—certain poisons (benzol) produce this syndrome, overexposure of blood-forming tissue to x-rays or radioactive substances, and invasion of marrow by tumors also produce this aplasia of erythropoietic tissue. There is also a form called idiopathic aplastic anemia, the cause of which is unknown. The evidences of this process are icterus index below 2.5, decrease in urobilinogen in the stools and frequently in the urine, and as these same changes affect the granulocytes, it is expected that they show evidence of a decreased rate of destruction (increased segmented forms, 5 or more nuclear subdivisions).

The deficient production of red cells (3) may have the above mentioned causes, but may also be produced by extensive osteomyelitis. Although there is an absolute deficiency in marrow, that lying near the lesion is irritated to abnormal activity, which is evidenced by very immature blood cells, both red and white. Evidence of attempts to conserve the already formed elements is also seen, as in the former case where the white corpuscle may have 5 or more subdivisions. A low icterus index and decreased urobilinogen excretion is also present. The color, volume and saturation indices are variable, but usually within normal limit.

2 INCREASED RATE OF RED CELL DESTRUCTION WITHIN BODY — This may depend upon extravasation of blood, presence of hemolytic poisons, bacterial toxins, hypotonicity of an intravenous injection medium, parasites (malaria), hyperactivity of blood-cell-destroying mechanisms, marrow production of cells with low resistance to destructive factors, or some abnormality

in another organ (spleen) If no other factor than increased blood destruction is active, there will be evidence of rapid regeneration of cells because the body still contains the necessary elements for reformation of the destroyed cell The expected findings would be increased number of young erythrocytes and other evidences of increased bone-marrow activity, with normal color, volume and saturation indices It is possible, in this case, that regeneration and destruction of the cells may be equal, but a study of the blood cells will disclose the process going on within the body

3 BLOOD LOSS FROM BODY includes all types of external hemorrhage In this condition the blood picture differs from the case above in that the materials for blood regeneration are lost It is obvious that there are 2 subdivisions, *viz*, *acute* and *chronic*

The acute type is frequently not apparent in the blood until the plasma volume begins to increase, followed by all the signs of increased bone-marrow activity (not present for the first few days) Later, decreased color, volume and saturation indices may occur

The chronic form may assume the characteristics of absolute insufficiency due to exhaustion of the hemoglobin and stroma-building materials The most characteristic changes, however, are the color, volume and saturation indices, particularly the latter

In conclusion Osgood and Harkins state that an accurate diagnosis and etiology of the anemia is essential in order to advance the proper treatment They also object with considerable reason to the term "secondary anemia," emphasizing the fact that the diseases included under this term differ widely in etiology, symptomatology, blood findings and in response to therapy

SYMPTOMATOLOGY.—Osgood and Harkins (*Ibid*) outline the various symptoms, in which the main factors are weakness, pallor, sore tongue, splenomegaly, spinal cord involvement, bloody stools, dark urine, dark line on gums, bronzed skin, diarrhea, digestive disturbances, abdominal pain (indicating ulcer or malignancy) and urinary disturbances

A careful survey of the neurologic aspects of primary anemia was made by R S Ahrens (*Arch Neurol and Psychiat* 28 92 (July) 1932) In a series of 189 cases he found evidence of spinal cord involvement in 97.77 per cent other than subjective sensory disturbances A résumé of the findings may be tabulated as follows:

Coordination disturbances	Per Cent
Arms	10.6
Legs	40.2
Rhombberg positive	41.7
Gait disturbance	27.9
Deep reflexes increased or diminished	90.4
Vibration sensation reduced	89.3
Superficial sensation disturbed	26.6

The gait disturbance was chiefly of ataxic or spastic character The patellar reflexes were about equally increased or decreased, but the Achilles reflexes were more apt to be decreased than augmented The Babinski sign was present in 15 per cent The high percentage of vibratory sensory disturbance was elicited by using a quantitative tuning fork measurement. Although paresthesias were noted in 133 cases, the author does not relate these to the cord changes. Mental changes, generally, slow cerebration and impaired memory, were noted in 25 cases Cranial nerve involvement is rare and generally partakes of slight pupillary disturbance. The author followed 34 cases over a considerable

period of time under liver therapy and concludes that liver has little or no effect on the central nervous system manifestations of primary anemia. The slight improvement in station, gait and coordinate movements occasionally observed is attributed to improved muscular tone and strength.

Another extensive analysis of the neurological features of pernicious anemia was made by R. H. Young (J. A. M. A. 99:612 (Aug. 20) 1932). He analyzed 515 cases and, in addition to 103 cases which manifested the usual spinal cord changes, reported 4.5 per cent with psychotic manifestations. One case had a sixth cranial nerve palsy, in 2 cases facial palsies were observed. True nystagmus was found in only 3 cases, although nystagmoid movements were not uncommon. Three patients showed speech disturbances, 7 gave a history of herpes. The spinal fluids were uniformly negative.

F. W. Bremer (Fortschr. d. Neurol., Psychiat. 1:12, 1931) has made a critical review of disease of the spinal cord in pernicious anemia, and brings out certain well established facts, as the occurrence of neurological signs preceding or without other signs of pernicious anemia. The assertion that the neurologic signs occur in 75 per cent of the cases before other manifestations of pernicious anemia is only allowable if paresthesias are regarded as neurologic signs. He believes that funicular myelitis may occur from causes other than pernicious anemia, despite the contrary assertions of other authors. He does not subscribe to the assertion that achylia gastrica is inevitable in pernicious anemia, although he recognizes the value of this finding in clearing up obscure neurologic cases. Little value is attributed to accessory psychic mani-

festations in diagnosis, especially of the early cases. Although he has noted little therapeutic value from liver on the neurologic manifestations, he believes prolonged and adequate liver therapy should be tried.

DIFFERENTIAL DIAGNOSIS.

—The following differential diagnosis has been suggested by Osgood and Harkins (*loc cit*).

- 1 Acute hemorrhage, internal
- 2 Acute hemorrhage, external
- 3 Malaria
- 4 Apparent anemia
- 5 Intestinal parasites
- 6 Sickle cell anemia
- 7 Myelogenous leukemias
- 8 Lymphatic leukemias
- 9 Hodgkin's disease
- 10 Lymphosarcoma
- 11 Poisoning with heavy metals (lead, mercury)
- 12 Poisoning with other blood-destroying toxins
- 13 Myxedema
- 14 Addison's disease
- 15 Aplastic anemia
- 16 Hemolytic icterus
- 17 Pernicious anemia
- 18 Pernicious anemia of sprue
- 19 Pernicious anemia of *Dibothriocephalus latus*
- 20 Pernicious anemia of pregnancy
- 21 Chronic hemorrhage
- 22 Dietary deficiency anemia
- 23 Chlorosis
- 24 Infections (including nephritis)
- 25 Uncomplicated malignant tumors
- 26 Cirrhosis of the liver
- 27 Banti's disease
- 28 Gaucher's disease

DIAGNOSIS —As has been pointed out earlier in this discussion by Osgood and Harkins (*loc cit*), anemia may be the result of the interaction of certain mechanical or chemical factors, also, the

presence of an anemia may cause alteration in mechanical or chemical factors which produce the symptoms necessary to suspect an anemia. The one fact remains, however, that the intelligent observer bases his diagnosis, prognosis and efficiency of treatment on the blood findings. Since the introduction of liver and its derivatives by Minot and Murphy, in 1926, the *prognosis* is decidedly better, before 1926, this was decidedly guarded, and the only definite palliative treatment was transfusion from a suitable donor. As the search for the "antianemic" factor became more intense, other organs, *i.e.*, kidney, spleen, beef muscle, stomach, etc., were found to be of use in the treatment of anemia, but the same fact stands out that the laboratory reports are the most accurate indicators of what is taking place within the anemic body.

Diagnostic Methods—The importance of differential diagnosis is emphasized by E. E. Osgood, H. D. Harkins and F. E. Trotman (J. Lab. and Clin. Med. 17: 859 (June) 1932). The value of the color index in differentiating between pernicious and other forms of anemia has been known for some time. As early as 1867, Johannes Duncan recognized the possibility of variation in the size and hemoglobin content of the red blood cells, but, due to lack of accurate methods, correct standards and complete records, it is only recently that the importance of the color index, as being of diagnostic value, has been appreciated. The newer volume and saturation indexes appear to be of equal diagnostic value.

These observers, like Haden, Davidson, and other accurate workers, employed oxalated venous blood for their hematologic methods and a normal group of blood determinations was used

for comparison. The blood counts reported were the average of 2 or more dilutions, which agreed within 100,000. Hemoglobin estimations were made by the Osgood-Harkins method, as were the cell volume determinations. Centrifugation was continued until cell volume remained constant. Controls gave error limits of plus or minus 2 per cent.

The cases studied were grouped and reported as follows:

In a group of 4 cases of *pernicious anemia* treated with the nuclear extract of Jones, Phillips, Larsell and Nokes, and 4 cases in which the liver diet of Minot and Murphy were employed, in both types of treatment it was noted that the color and volume indexes, which were low, returned to normal.

Another group contained 10 cases of chronic hemorrhage in which no other anemia-producing factors were discovered, in this group all of the indexes tended to be low. In a second group of chronic hemorrhage, 15 cases were studied which were complicated by another anemia-producing factor; in this group the saturation index was also low. The authors conclude that this low saturation index occurs so rarely in any other type of anemia that chronic hemorrhage should be considered as the most probable cause of any anemia showing a saturation index below 0.85 until it has been definitely excluded. This is a very important diagnostic point, for it is thus possible to reach a correct conclusion the first day the patient is seen, even though the bleeding may have stopped previously or several days may be required to discover the source.

In attempting to arrive at a diagnosis it is well to remember that a high saturation index is against chronic hemorrhage, even though bleeding is seen.

In another group the *anemias due to infection* were arranged in disease groups. The anemia almost constantly associated with nephritis and running parallel to the severity of the nephritis seems to indicate bone-marrow depression (normal indexes, low reticulocyte counts and icterus index, absence of urobilinogen in the urine) rather than hemolysis. This anemia is so common in *chronic diffuse nephritis* that a hematologic study is of great value in differentiating it from hypertensive cardiovascular renal disease, in which anemia rarely occurs.

In another group, the *anemia associated with disease of the blood-forming organs*, the indexes are normal.

In a group of miscellaneous anemias, 2 cases of *chlorosis* gave findings similar to the chronic hemorrhage group. In more severe cases of chlorosis, other observers have found much lower color, volume and saturation indexes. *Malignant tumors* showed normal indexes in contrast to low indexes of carcinoma cases complicated by hemorrhage. *Malaria* showed normal indexes. Similar findings were observed in 1 case of *lead poisoning* and in a case of *acetamide poisoning*. The lead poisoning case is interesting in that 18 nucleated red cells per 100 white cells were counted, many of these cells were typical megaloblasts which the authors state would have, unquestionably, been diagnosed pernicious anemia had only the old stained smear method been used.

A case of *glandular deficiency* producing an anemia is reported. This case simulated pernicious anemia, except that the color and volume indexes remained normal, which were the differentiating points. The *pernicious anemia of pregnancy* gave high color and volume indexes. *Sickle cell anemia* re-

sults are not presented by the authors as being correct, as white standards were used.

Other cases of pernicious anemia clinically misdiagnosed and erroneous clinical diagnoses of pernicious anemia were cited, comparison showing a clinical error of 12 per cent in 100 cases, as contrasted with 2 per cent when a color and volume index below 1.25 was used to exclude pernicious anemia.

In their conclusions Osgood, Harkins and Trotman (*Ibid*) present convincing evidence that the use of the volume index is most valuable in recognizing the most characteristic change in pernicious anemia, *i.e.*, preponderance of macrocytes in the blood. They also conclude that if either the color or volume index is above 1.25, the patient, with rare exceptions, will prove to have pernicious anemia and should be given liver therapy.

A low saturation index indicates chronic hemorrhage, when the patient should be given iron while a search is made for bleeding.

The authors give warning that if these indexes are not determined accurately with controlled technic and with calculations based on the correct normal standards now available, they are misleading and worse than useless.

Osgood and Harkins (*loc cit*) consider that the lowest number of red cells compatible with life lies between 400,000 and 800,000 and the hemoglobin between 1.5 and 3.0 Gm per 100 cc. Figures approaching these, call for immediate active treatment or the prognosis is bad.

Davidson feels justified in saying that the administration of liver in *pernicious anemia* may be likened to the use of insulin in diabetes or thyroid in myxedema. Although liver therapy does

not produce a permanent cure, it does in the majority of cases return the patients to normal health and permits them to reach their allotted span of years

The consensus of opinion is, therefore, that treatment in suitable form started before too much damage has been done renders the prognosis of any anemia favorable in the majority of cases

TREATMENT—Two very fundamental points in the treatment of any type of anemia are brought out by G R Minot and W B Castle (Ann Int Med 5 159 (Aug) 1931): (1) enough of the potent material used in the treatment, regardless of whether it is liver, kidney, stomach, brain or potent preparations from these substances, (2) attempt to eradicate the causative factor of the anemia

In the discussion, they point out that the amount of liver, etc., purchased is not always the amount ingested, the patient occasionally missing here and there a dose. Also, in the preparation of raw liver pulp or cooking liver, as much as 35 per cent of the tissue is lost. Another fallacy is pointed out that in the taking of extract from 100 Gm. ($3\frac{1}{3}$ ounces) of an organ, both the patient and the doctor believe, erroneously, that the equivalent of 100 Gm ($3\frac{1}{3}$ ounces) of that organ has been taken, while often it does not exceed 65 per cent. of the contained potent factor

In order to check the potency of the material, reliance should not be placed upon anything but the clinical course and the blood studies, particularly the reticulocyte count in that particular case.

These observers state that the daily feeding of various substances, such as 200 to 300 Gm. ($6\frac{2}{3}$ to 10 ounces) of prepared liver or kidney, active extracts derived from 300 to 600 Gm (10 to 20

ounces) of liver, 150 to 240 Gm (5 to 8 ounces) of fresh whole pig stomach mucosa, or dried and defatted stomach (if brain is used the amount is about 3 times as much as liver), will initiate a remission. Failure to initiate a remission with this adequate dosage indicates either incorrect diagnosis or complications. Occasionally, unusually large doses are indicated because of complications or difficulties in absorption, in this case, the amount may be doubled or the amount of potent material for 1 week may be administered in 1 dose *via* the stomach tube to a moribund patient.

While this treatment is being carried out, attempts should be made to eliminate any complicating factors.

The maintenance dose of potent material necessary to keep the blood cell count and the hemoglobin level normal varies widely and should not be a too arbitrary figure. The signs and symptoms, as well as the blood findings, should determine whether the *dose of potent material should be increased or more rarely decreased*. Particular attention should be paid to central nervous system symptoms, as these are frequently a very good guide as to the adequacy of the maintenance dose and are equally as important as any laboratory examination.

Again referring to Minot and Castle (*loc. cit.*), who point out that the patients who do best are those who take daily doses of distinctly large amounts of the potent material in contrast to those who take just sufficient to maintain definite improvement. They state further that the prescribing of proper amounts of the potent factor depends on knowledge of conditions inhibiting its action, some of which are, infections, liver and kidney disorders, arteriosclerosis, increased neurological mani-

festations Murphy and West, of New York, suggest that it is unwise perhaps for these patients to expose themselves to the sun sufficiently to tan their bodies intensively, which seems to aggravate the neurological manifestations. Other inhibiting factors are gastrointestinal disturbances, dietary intemperance and improprieties, chronic blood loss, concomitant disease and, not the least of all causes, curtailment of the dose of potent material. They suggest that on the slightest provocation the dose should be increased and it is probably unwise in any case for any patient with pernicious anemia to take daily less than 200 Gm ($6\frac{2}{3}$ ounces) of prepared liver or potent material equivalent to that contained in the most potent commercial extract derived from 300 Gm (10 ounces) of liver.

In cases complicated by *achlorhydria*, sufficient **hydrochloric acid** should be prescribed, while in *chronic hemorrhage*, **iron** should be administered.

In the type of anemias commonly called "*secondary*," benefit may sometime be obtained by the use of **iron** alone or in conjunction with **copper**. In certain of the anemias, diet should be suspected of not containing sufficient amounts of protein or vitamins, the treatment being quite simple in these cases. **Dietary insufficiencies** are common etiologic factors in anemia and careful study should be made of the food history of the patient.

In a cryptic tabular outline by Osgood and Harkins (*loc cit*), the differential diagnosis is accompanied by the therapy of the tabulated conditions as follows: *acute hemorrhage*, caused most commonly by ectopic pregnancy, ruptured viscus, wounds or operative procedures, should be treated by **transfusion** or intravenous **acacia solution** and stop the

bleeding. *Malaria* caused by parasites in the blood should be treated by **sunshine** or **ultraviolet light**. *Intestinal parasites* produce the picture of chronic blood loss and should, therefore, be treated by **iron** and cell stroma-building materials, as well as **anthelmintics** and **sanitation**. *Sickle cell anemia* seen in the negro race should be treated, in the severe cases, by **splenectomy**. *Myelogenous leukemias*, *lymphatic leukemias*, *Hodgkins's disease* and *lymphosarcoma* complicating the anemia should be treated by **x-ray**, **radium** and **palliatively** as these diseases have a poor prognosis at the present state of knowledge. *Myxedema*, when the basal metabolic rate is below minus 15, should receive appropriate **thyroid therapy**, as well as for the anemia which it is complicating, this also applies to Addison's disease and its treatment with **cortin**.

Aplastic anemias, including those induced by benzol, organic arsenicals and radioactive substances, should be treated by **transfusion** and **removal of the cause**. *Hemolytic icterus* should be treated by **splenectomy**.

In the treatment of pernicious anemia, Osgood and Harkins concur with the opinion of most modern writers that the specific in this disease is a *diet rich in nuclear material containing the potent factor in adequate amounts*. This treatment is also believed to be the best in cases of the pernicious anemia of *sprue*, pernicious anemia of *Dibothriocephalus latus* which parasites should be eliminated by **anthelmintics**, and the *pernicious anemia of pregnancy*. As to the termination of pregnancy, which is suggested by these authors, it was pointed out by Wilkinson (*loc cit*) that adequate liver therapy was used in several of his cases and the termination of preg-

nancy was not necessary. In *chronic hemorrhage*, the treatment consists of **stopping the bleeding** and administering **iron**. *Dietary deficiency anemia*, which is now most frequently seen in food faddists, children, or peptic ulcer cases on an exclusive milk diet, should be treated by prescribing a diet adequate to meet the needs, **iron** in sufficient quantities, and **liver**. The *specific* in the treatment of *chlorosis* is **iron**. Anemia due to infection (including nephritis) should be treated as specifically indicated, **transfusion** and **removal of infection** are suggested. *Malignant tumors* which are uncomplicated by hemorrhage, secondary infection, or bone-marrow involvement, should be treated, according to Osgood and Harkins, by **x-ray**, **radium** and **operative removal**. *Cirrhosis of the liver*, Laennec's cirrhosis being far the commonest type, should have a low protein diet. *Banti's disease* should be treated first by **transfusion** followed by **splenectomy**.

In the use of the foregoing therapy Osgood and Harkins (*loc cit*) state that only the most specifically beneficial treatment is indicated in the briefest possible form. They also remark that **liver**, including its extracts, **desiccated stomach**, and all the nuclear material mentioned, is specifically productive of a reticulocyte count in cases of pernicious anemia, also that **iron** refers to therapy, not with inorganic iron in large doses alone, but to therapy with all the known hemoglobin and red cell stroma-building substances. They point out that to merely prescribe some iron for a patient thought to be suffering from a secondary anemia, today borders on malpractice. Every case should be thoroughly studied from all angles, when adequate therapy, intelligently con-

trolled, will give satisfaction to both patient and doctor.

Recent investigation has shown that certain forms of *hypochromic anemia* are primarily due to a deficiency of iron. The study of the effects of oral administration of iron has been valueless, due to the fact that the larger part of it leaves the body by way of the feces unchanged. Since the greater part of the iron in the body is to be found in the hemoglobin, this appears to be the substance which demands attention.

The purpose of the study made by C W Heath, M B Strauss and W B Castle (J Clin Investigation 11 1293 (Nov) 1932) was (1) to describe the dosage of iron which may be given parenterally in hypochromic anemia and to compare it with the dosage by mouth, and (2) to determine the fate of the iron administered parenterally and establish a quantitative basis for the better knowledge of this type of deficiency.

This study was made from a series of 17 consecutive cases of hypochromic anemia treated with **iron parenterally**. The anemia was either of the idiopathic hypochromic type or due to chronic blood loss, inadequate diet, previous pregnancies, or combinations of these factors. Complications inhibiting blood formation such as severe sepsis, damage to organs, or carcinoma, were absent in all the cases. Adequate periods of control before therapy was instituted were studied.

Blood reticulocyte counts were taken daily from the ear and venous blood was taken every second or third day for complete blood studies. Except in 2 cases, **iron citrate green** (N. N. R.), usually in 10 per cent. solution, was used daily by the intramuscular or subcutaneous route. This solution consisted of neutralized iron and ammonium

citrate with 0.5 per cent quinine and urea hydrochloride as a local anesthetic. There was approximately 16 per cent of metallic iron. The dose corresponded to from 8 to 32 mgm ($\frac{1}{8}$ to $\frac{1}{2}$ grain) of metallic iron at each injection. Orally, iron and ammonium citrate were used in doses of 6 Gm ($1\frac{1}{2}$ drams) daily corresponding approximately to 1 Gm (15 grains) of metallic iron. The 16 to 32 mgm ($\frac{1}{4}$ to $\frac{1}{2}$ grain) doses parenterally were found to be the level of tolerance in most patients.

The first 10 cases, after the control period, were given iron parenterally for about 10 days and immediately followed by the daily oral administration of iron and ammonium citrate. It was decided by the authors that following the subsidence of a rise of the reticulocytes due to the uniform daily administration of the first substance, a rise of the reticulocytes due to the administration of the second substance, in the quantity given, is more potent than the first in the quantity given, provided the 2 are similar in their quality.

The figures of the charts and graphs would seem to indicate that the parenteral administration of 32 mgms ($\frac{1}{2}$ grain) of iron was somewhat more effective dosage than 1000 mgms (15 grains) of iron given orally. This, of course, is based on the hemoglobin response. On the other hand, if the reticulocyte response is considered, it is clear to see that a daily dose of 1000 mgms (15 grains) of iron orally is more effective than a dose of 32 mgms ($\frac{1}{2}$ grain) parenterally.

All things being taken into consideration, it is believed that a daily dose of 1000 mgms (15 grains) of metallic iron given orally in the form of iron and ammonium citrate is approximately equivalent in its blood-building power to a

daily dose of 32 mgms ($\frac{1}{2}$ grain) of metallic iron given parenterally in the form of iron and ammonium citrate to patients with hypochromic anemia.

Experimental work has led the authors to conclude that the amount of iron within certain maximum limits given parenterally in hypochromic anemia corresponds closely to the amount of iron gained in the circulating hemoglobin and is apparently utilized to a very large extent in the building of new hemoglobin. The corollary to this conclusion is that the daily dose of parenteral iron must be of the same magnitude as the amount of iron in the desired daily rise of hemoglobin. If the average daily rise in hemoglobin is about 1 per cent per day, it is evident that there would be a gain of about 7.8 Gm (2 drams) of hemoglobin containing 23.4 mgms ($\frac{3}{8}$ grain) of iron daily. This is so close to the 32 mgms ($\frac{1}{2}$ grain) of iron in the parenteral dose that this method has no distinct advantage over the oral administration of the proper amount. It is not uncommon to observe a daily rise of over 2 per cent per day hemoglobin formation which would require more than 32 mgms ($\frac{1}{2}$ grain) of iron parenterally for its equivalent and would certainly be a dangerous dose. Further studies may show that parenteral administration may be advantageous where there is some abnormality of the gastrointestinal tract, preventing the proper absorption of the iron. Again, the psychic factor may be overcome by the use of iron parenterally.

An explanation is given by the authors that the hypochromic types of anemia are due to a deficiency of iron, preventing adequate hemoglobin formation. The relationship of the deficient substance, iron, to the deficiency itself, which is mainly in the circulating hemo-

globin, can also be expressed in a quantitative fashion

ANEMIA OF CHILDREN.—ANEMIA OF PREMATURE INFANTS.—SYNONYMS which have been applied to this condition are, according to A F Abt and Beth R Nagel (J A M A 98 2270 (June 25) 1932), *physiologic* and *hypoplastic* anemia of premature infants

DEFINITION—This form of anemia occurs regularly in otherwise healthy premature infants during the first quarter year of life

ETIOLOGY.—According to Abt and Nagel (*loc cit*), the exact mechanism of the development of this anemia still remains unexplained. From a review of the literature these authors have found the following theories for the cause of anemia of the premature infant to be the most tenable (a) the lack of an adequate iron reserve depot, and its early depletion, (b) a functional insufficiency of an imperfectly developed hematopoietic system. The chief objection to the depleted iron reserve depot for explaining this type of anemia has been the fact that prophylactic feeding of iron has not prevented the development of the anemia. G Sanpaulesi (Jahrb f Kinderh 132 277 (Aug) 1931) advances theoretical and experimental evidence in support of the theory that an increase in the fluid volume of the blood causes the premature anemia through dilution. According to the author, this hydremia mechanically lowers the erythrocyte count and the hemoglobin value

SYMPTOMATOLOGY.—The anemia, Abt and Nagel state, is often marked by intense pallor. The ear lobes are pale and transparent and the mucous membrane and nail beds are

markedly pale. While enlargement of the spleen is uncommon, the liver is occasionally increased in size. The appetite and general well-being of these infants is in no way impaired and they show no elevation of temperature or constitutional derangement.

Blood Picture—For the first few days after birth the blood of the premature infant shows high values for hemoglobin content and number of erythrocytes, similar to the values found in the full-term newly-born infant. At this period, fetal characteristics, such as erythroblastosis and polychromia, are present to a higher degree in the blood of the premature than of the full-term infant. Regularly during the first 3 months there is noted a marked drop in the hemoglobin and the red count, beginning from the fourth to the fifth weeks of life and reaching the lowest values between the eighth and the twelfth weeks. Thereafter, a gradual improvement is noted in both the erythrocyte count and the hemoglobin content of the blood, until values are reached at the sixth to the eighth months of life which compare normally with those of the full-term infant.

In the study made by Abt and Nagel (*loc cit*) the shorter the intrauterine life or the more premature the infant, the more severe was the anemia that developed. The red blood cells were of normal shape and size at birth, and in those infants who developed anemia with erythrocyte and hemoglobin values under 3 million and 45 per cent, respectively, anisocytosis and poikilocytosis were noted. These changes were most marked, the more severe the anemia. Nucleated red blood cells and polychromia of the erythrocytes were present and both were in normal numbers for premature infants. This was

more pronounced in the premature than in the full-term infant. By the fourth week of life these elements disappeared, and they did not again reappear during the course of the anemia. The reticulated red blood cells were highest in number at birth and in the first few weeks of life and thereafter retained a more or less constant level, regardless of the administration of liver fraction, desiccated hog stomach or liver fraction and iron in combination.

PROPHYLAXIS—Abt and Nagel (*loc cit*) have concluded that in the prophylaxis of premature anemia iron therapy alone is of doubtful value. Further, neither the use of desiccated hog's stomach (ventriculin) nor the use of liver fraction alone proved of value in the prevention of anemia. The data obtained indicated that a combination of liver fraction and ferrous ammonium citrate, started within the first 14 days after birth, with initial dosages of from 1 to 2 Gm (15 to 30 grains) twice daily, was the most efficient of the prophylactic agents investigated. E Schiff and N Joffe (*Klin Wchnschr* 10 1946 (Oct 17) 1931) were unable to demonstrate any prophylactic value with copper and with copper and iron combination in the prophylaxis of premature anemia.

ANEMIA OF NEWBORN.—**DEFINITION.**—Anemia of the newborn has always been an interesting but little understood disease. According to A F Abt (*Am J Dis Child* 43 337 (Feb) 1932), it is a condition of unknown etiology occurring in a group of reported cases in which newborn infants of healthy parents, born in normal labor, and from whose history hemorrhage or loss of blood has been carefully excluded, suddenly become profoundly anemic within the first 14 days of life.

SYNONYMS.—Idiopathic, primary, or congenital anemia. Abt (*loc cit*) contends that all of these terms are objectionable. Since the explanation of the exact mechanism of the cause of this anemia is as yet unknown, the term "idiopathic" conveys no definite meaning. These anemias are of a secondary type and should not be confused with primary pernicious anemia. The congenital nature of the disease has not been proved. L H Segar and W Stoeffler (*J Pediat* 1 485, 1932), however, report anemia of the newborn developing in 3 consecutive babies of the same parents.

The *etiology* of anemia of the newborn is unknown, nor, according to Abt (*loc cit*) can the anemia be adequately explained until the exact mechanism of the normal adaptation of the blood-forming and blood-destroying processes in this early stage is known.

According to L H Diamond, K D Blackfan, and J M Baty (*J Pediat* 1 269, 1932) anemia of the newborn seems to be closely related to other so-called clinical conditions. For instance, when anemia has been the presenting symptom, the syndrome has been spoken of as "congenital anemia of the newborn", when the anemia has been marked by a severe degree of jaundice, the term "icterus gravis neonatorum" has been used, when attention has been directed to an enlarged liver and spleen in association with icterus and anemia, together with signs of unusual erythroblastic activity in the extramedullary organs and in the peripheral blood, the name "erythroblastosis fetalis" has been applied, when edema has been most outstanding in addition to anemia, splenomegaly, hepatomegaly, and unusual erythroblastosis, the condition has been described as "unusual edema of the fetus."

Although anemia of the newborn is generally considered to be uncommon, it probably occurs more frequently than the paucity of the case reports would indicate, since blood counts in newborn infants are but infrequently done. H D Pasachoff and L Wilson (*Am J Dis Child* 42 111 (July) 1931), E. Stransky (*Ztschr f Kinderh* 51:239, 1931), and A Abt (*loc cit*) have recently reported cases of this type of anemia.

The only constant and characteristic *clinical symptom* is pallor, according to Pasachoff and Wilson. This pallor of sheet-like whiteness, Abt states, occurs in babies while thriving and behaving in every way as normal newborn infants.

The infants reported by Segar and Stoeffler (*loc cit*) took their feedings and gained surprisingly well until the pallor reached a certain degree of severity, when lassitude and vomiting, the latter often projectile, made their appearance. The spleen may or may not be enlarged.

The *blood picture*, according to Pasachoff and Wilson, shows a striking similarity to that of an acute post-hemorrhagic anemia. From the analysis of the blood study of previously reported cases, there is found to be a considerable reduction in the number of erythrocytes, with a corresponding reduction in the hemoglobin, so that the color index is 1.0 or slightly above. There is a moderate increase in the number of leukocytes, with a small percentage of immature white blood cells. The differential count and platelet count are normal. Abt states the coagulation and bleeding times are not prolonged and in the reported cases, the fragility test was found to be normal twice and once prolonged. There is a moderate degree of anisocytosis and poikilocytosis,

and the presence of normoblasts indicate some active regeneration in the red blood cells. In a recent case reported by Abt (*loc cit*), a rare hematologic finding, mononuclear erythrophagocytosis, was present in the circulating blood. The condition was thought to have no bearing on the etiology of anemia of the newborn.

PROGNOSIS.—According to Abt (*loc. cit*), infants with anemia of the newborn, have gradually recovered without demonstrable residual effect, both without and with medication, and the transfusion of blood. Stransky (*loc cit.*) has classified these cases of anemia according to the presence or absence of immature blood cells in the circulating blood. He observed that the greatest number of immature cells occurred in the fatal cases, while those which recovered showed comparatively few embryonal forms. He contends that the severity of the disease is dependent upon the degree of involvement of the hematopoietic system. In the fatal cases there is probably a faulty or incomplete development of the organs of hematopoiesis, while in those of lesser severity there is a temporary insufficient hematopoiesis.

TREATMENT.—Segar and Stoeffler (*loc. cit*) considered lassitude and vomiting an indication for **transfusions** in anemia of the newborn. The authors felt that transfusions in their cases were the means of sustaining life until the hematopoietic process began to function normally.

PERNICIOUS ANEMIA.—There has always been a question as to the occurrence of pernicious anemia in infancy and childhood. According to T B Cooley and Pearl Lee (*J. Pediat.* 1:184 (Aug) 1932), a few cases have been reported, but so far as the authors

know, in none have modern diagnostic criteria been rigidly applied. They are inclined to accept the general dictum that true pernicious anemia is known in childhood.

BLOOD PICTURE—Cooley and Lee have observed a type of anemia occurring in infants from the third month to the end of the first year which presents a blood picture strikingly similar to that seen in pernicious anemia.

ETIOLOGY.—These authors are of the opinion that the blood picture is due to a deficiency in iron and that the output of unripe cells is due to the inability of the marrow to produce enough mature cells with the material on hand.

There were 4 common features in the cases reported by the authors. *First*, macrocytosis occurred in all instances. There was a good deal of variation in size, some microcytosis, and the kind of poikilocytosis usually associated with the pernicious anemia syndrome. The color index was high, always close to 1, and sometimes greater. The cells were well filled with hemoglobin and the smears showed practically no achromia. Polychromatophilia was nearly always marked. Reticulocytosis sometimes ran to high figures. Normoblasts, megaloblasts and nucleated forms were present. The white cells were more variable. Three patients showed marked leukopenia, while 2 had pronounced leukocytosis. In spite of these variations the differential count was not typical and of little significance. The low platelet counts in the acute stage, without petechiæ or hemorrhage, were striking.

The *second* common feature was the history pointing to iron deficiency for one or another reason. While it is true that children of anemic mothers do not necessarily become anemic, 4 of their cases seem to furnish evidence that the

mother's anemia may sometimes be an important factor.

A *third* common feature in the 6 patients who survived was the surprisingly rapid, permanent recovery from seemingly grave anemia with no other treatment in any case than what might be supposed to be a temporizing procedure.

A *fourth* feature was the rapid disappearance of abnormal red cells.

Cooley and Lee have no explanation for the differences between their cases and the commoner form unless it be the more rapid development and greater severity which place a sudden stress upon marrow.

NUTRITIONAL ANEMIA.—**SYNONYMS** frequently applied to this type of anemia are simple anemia; alimentary anemia, milk anemia, chlorotic anemia of infants, and anemia of the premature.

DEFINITION.—Nutritional anemia is defined by J. Greengard (J. Am. Dietet. A 8 33 (May) 1932) as simple anemia commonly encountered in infancy which is not associated with infection, blood loss, specific blood dyscrasias, or hemolytic processes.

ETIOLOGY—The etiology of this type of anemia, according to Greengard, must be dependent upon a deficiency of the inorganic elements, the organic elements, or of food accessory substances necessary to bring about the utilization of the mineral and organic elements in the production of red cells and hemoglobin. While the condition occurs with great frequency in infancy, it may occur at any age. R. A. Kern (Ann. Int. Med. 5 729 (Dec.) 1931) states that adolescence is the next period in which anemia due to diet low in iron and in other hemoglobin building foods is often seen. Chlorosis is the most marked example of this group. Again, there is an

increasing number of chloro-anemias in middle life due to low iron diet. According to Kern, it is conceivable that an associated *avitaminosis* could aggregate the anemia-producing effect of a diet also deficient in red cells and hemoglobin building material.

TREATMENT—S. G. Zondek and M. Bandmann (*Klin Wchnschr* 10:1528 (Aug 15) 1931) found that the copper content of human milk is about 3 times as great as that of cow's milk. Because of the great biologic significance of copper, especially for the growing organisms, *prophylactic* administration of copper seems advisable for artificially fed infants.

Iron and Copper—C. A. Elvehjem and E. B. Hart (*J Biol Chem* 95:363 (Feb) 1932) have observed that when pure iron was added to the whole milk diet of anemic pigs, there was a small, temporary improvement in the hemoglobin content of the blood, but a rapid and complete recovery was obtained only after copper was supplied in addition to the iron. J. M. Orten, F. A. Underhill, and R. C. Lewis (*Ibid* 96:1 (Apr) 1932) obtained somewhat similar results in attempting to prevent the development of nutritional anemia in rats on a milk diet. According to H. H. Beard, Catherine Rafferty, and V. C. Meyers (*Ibid* 94:111 (Nov) 1931) iron, supplemented by cobalt, nickel, manganese or arsenic does not seem to appreciably aid in preventing anemia. Orten, Underhill and Lewis (*loc. cit*) have concluded that of all metals studied, copper alone has the ability to supplement iron in preventing nutritional anemia of the rat.

H. W. Josephs (*Ibid*. 96:559 (May) 1932) studied the retention of iron and its partition between the hemoglobin and the tissues in rats. It was found that

during the nursing period the retained iron was sufficient to account for the gain in hemoglobin, but that, if the diet of milk was continued beyond the nursing period, all retained iron went to maintain the tissue iron as a constant mineral concentration which is considered to represent the "function iron" of the tissues. When extra iron was given, this was divided between the hemoglobin and the tissues, most of it going to hemoglobin formation. When copper was given, a large proportion of the retained iron went to form hemoglobin, the tissue iron was reduced in amount, and the reduction was carried down to it, but not below the level of concentration which was considered to represent the function iron of the tissue. Copper had no effect on iron retention.

Food.—Mary S. Rose and Ella M. Vahlteich (*Ibid*. 96:593 (June) 1932) studied the factors in food influencing hemoglobin regeneration in rats made anemic by milk feeding. It was found that nutritional anemia in rats could be cured in 6 weeks by supplementing milk with whole wheat, prepared bran, or oatmeal in quantities to furnish as much as 0.2 mg. of iron daily. Copper, as well as iron, was a factor in obtaining the therapeutic results. The authors observed, however, that there seemed to be other factors than iron and copper which may influence hemoglobin regeneration and that these factors are probably present in greater amounts in oatmeal than in white flour.

Pearl Summerfeldt, F. F. Tisdall and A. Brown (*Canad. M. A. J.* 26:666 (June) 1932) found that a secondary anemia of the nutritional type induced in rats could be cured when 33 to 50 per cent of the total diet consisted of a special cereal or biscuit in which there was a relatively high proportion

of copper and iron Farina, oatmeal, zweiback, arrowroot, and whole wheat biscuits were also tested but did not cure anemia when fed in the same quantities. Chemically, when a group of normal children were fed the special cereal there was an increase in the hemoglobin, whereas on ordinary cereal there was no increase.

Oysters, because of their large copper content, were studied by H Levine, R E Remington and F B Culp (*J Nutrition* 4 469, 1932) to determine their influence on hemoglobin regeneration when fed to rats rendered anemic on a milk diet. The addition of dried oysters to the diet allowed a regeneration to the normal hemoglobin. It was found that the inorganic elements present in the oysters are responsible for their antianemic potency.

Amino-acids in Milk Anemia—D L Drabkin and H K Miller (*J Biol Chem* 93 39 (Sept) 1931) were able to relieve milk anemia in rats by the addition of pure amino-acids to milk containing a quantity of iron insufficient in itself to be of therapeutic value.

Of the amino-acids studied thus far, **arginine**, **glutamic acid**, and their salts have proven to be very effective for hemoglobin regeneration. The recovery from the anemia with these supplements was continuous and progressive. However, C A Elvehjem, H Steenbock and E B Hart (*Ibid* 93 197 (Sept) 1931), working with glutamic acid, found this amino-acid to be completely inactive as a supplement to iron when it is properly purified.

Irradiation—P C Foster (*J Nutrition* 4 517, 1932) observed that irradiation with a quartz mercury arc has a slight but definite effect in increasing the hemoglobin content of the blood of rats rendered anemic by a milk diet.

The number, size, and saturation of the red cells were also increased. A flaming carbon arc from "Sunshine" carbons had no effect.

ANEMIA OF CHILDHOOD.—**DEFINITION**—Anemia, according to I N Kugelmass and M Lampe (*Am J Dis Child* 43 291 (Feb) 1932), is not only a reduction in the normal amount of hemoglobin and erythrocytes of the blood, but a diminution in its other components, *i e*, in the white cells, in the platelets, and in the blood volume. A C Hampson (*Practitioner* 127 460 (Oct) 1931) states that the term implies a reduced percentage of hemoglobin in the circulating blood.

ETIOLOGY.—The causes of anemia in children, according to Hampson (*loc cit*) are, on the whole, not markedly different from those found in adults, but the irritability of the hemopoietic system of the former often adds features which dominate the picture to such an extent that the disease is regarded as one peculiar to childhood. One of the most striking features in the study of anemia in children is the intensity of the reaction in response to a small stimulus.

J W Bruce (*Kentucky M J* 29 599 (Nov) 1931) states that anemias may be classified on an etiologic basis. (1) anemia due to blood loss; (2) anemia due to blood destruction within the body, (3) anemia due to deficient blood formation. Hampson (*loc cit*) points out that anemia may be due to blood dilution caused by an increase in the volume of the circulating plasma. The most common causes of anemia in infancy, Bruce states, are nutritional disturbances, chronic infections and prematurity. All 3 of these conditions are associated with a deficient blood formation.

According to Hampson (*loc cit*), the 2 forms of anemia encountered in the infant are (a) an early hemolytic type, associated with jaundice, and (b) a later, nonhemolytic type due to deficiency of iron. The milder forms of these 2 types may be regarded as physiologic. Before birth, the process of the supply of oxygen to the fetus is in many ways comparable to that of tissue oxidation, several layers of cells intervening between the red cells of the mother and those of the fetus. Fetal blood is more acid than that of the mother and the hemoglobin carries less oxygen. After birth, conditions are different and it is readily understandable that the value of the hemoglobin should fall. In the fetus, both the plasma and red cells are "more acid" than normal. When postnatal respiration has commenced, the plasma becomes "more alkaline" than normal. It is conceivable, then, that some degree of hemolysis would occur until the "fetal" cells are replaced by the postnatal type.

TREATMENT—Liver—J. Greengard, S. Maurer and C. Kluver (J. A. M. A. 98 1069 (Mar 26) 1932) found it possible to control the anemia of early infancy by the administration of liver extract and iron which contained traces of copper. The administration of iron with traces of copper to anemic infants failed to bring about an improvement in blood in about 50 per cent of the cases, and liver alone failed in 72 per cent. The patients in the latter group made significant improvement in blood findings after iron was added. It is interesting to note that those infants of the iron series who had failed to show improvement in their blood on the iron and copper mixture, when they received liver extract in addition made good gains.

Iron and Copper.—Iron, according to C. A. Elvehjem (*Ibid* 98 1047 (Mar 26) 1932), is the material used in the construction of the hemoglobin molecule, while copper is necessary in only small amounts as a catalyst. A similar relationship exists in the case of calcium and vitamin D; the latter cannot replace calcium, but it is very essential for the utilization of this element. The effect of the iron, according to H. Josephs (Bull. Johns Hopkins Hosp. 49:246 (Oct) 1931), is first on the reticulocytes, then on the hemoglobin. There usually exists a latent period before the effect on the hemoglobin is manifested by a rise. The end of the latent period appears to coincide with a sufficient rise in reticulocytes. Copper appears to accelerate hemoglobin formation, and has no effect on the reticulocytes.

Josephs studied a series of infants with *secondary anemia* treated by means of iron, and iron with copper supplement. It was found that copper accelerated the rise in hemoglobin when given in addition to iron. The acceleration was most evident when the hemoglobin was above about 50 per cent, above that point the hemoglobin curves from cases on iron alone tended somewhat to flatten out, whereas those from cases on iron and copper continued to rise steeply up to about 70 per cent. It made no difference, in this series, whether the child was on a diet of milk alone or whether vegetables or eggs were included.

Organic vs. Inorganic Iron.—It has been suggested, according to Elvehjem, that when organic iron is fed, it is used directly; but when inorganic iron is supplied, copper must be added to allow its utilization. However, Elvehjem has found that in the absence of

copper, organic iron (hematin) is as ineffective as inorganic iron (ferric chloride) for the cure of nutritional anemia in rats. Furthermore, it was observed that organic iron in the presence of copper promotes a partial cure of the anemia in rats, but the regeneration is neither so rapid nor so complete as the recovery obtained when ferric chloride is used as the source of iron. Josephs (*loc cit*), in his study of the effect of iron, and iron and copper in the treatment of *secondary anemia* in infants also observed that medicinal iron was far superior to food iron in causing a rapid recovery.

ANEMIA ASSOCIATED WITH INFECTION.—Anemia associated with infection, according to N. Kugelmass and M. Lampe (*loc cit*) usually results from either the diminished production of erythrocytes, the so-called *aplastic anemia*, or from increased destruction of circulatory erythrocytes, the so-called *hemolytic anemia*. Certain infections, on the other hand, may actually be productive of hemorrhage to the extent of being the determining factor in the development of the resulting anemia. All forms of anemia occur, from that due purely to the absence of blood formation to that due to increased blood destruction, and between these extremes are observed instances in which both factors play a part and in which one factor may be much more in evidence than the other.

A systemic study of the infectious diseases, both acute and chronic, in children was made by Kugelmass and Lampe from the standpoint of the associated anemia, in order to determine the factors operative in depressing the hemoglobin and red cells of the circulating blood. Such determinations are made possible by the fact that the retic-

ulated cell count is directly related to the level of bone-marrow function, and the *icteric index* parallels the amount of hemoglobin destruction in the circulating blood.

The presence of immature red blood cells in the circulating blood is an indication of an accumulation of new cells in response to some strong stimulus. Part of the pigment liberated in hemolytic anemia on disintegration of the hemoglobin molecule, is transformed into bilirubin. It circulates in the blood in protein combination, and is liberated and excreted by the liver. The bacteria in the intestinal tract further transform it into urobilinogen, which is reabsorbed into the portal circulation. It is again absorbed by the liver, reconverted into bilirubin and excreted into the bile. Abnormal destruction of red blood cells will, therefore, be reflected in the excretion of bilirubin and in the production of urobilinogen, provided liver function is not greatly impaired and there is no biliary obstruction. If the rate of urobilinogen formation exceeds that at which it can be removed from the portal circulation by the liver, it will enter the general circulation and be excreted into the urine. Excessive urobilinuria and increase in plasma bilirubin may result from 2 entirely different pathologic processes—hepatic insufficiency or hemolysis. On the other hand, when there is complete obstruction to the excretion of bilirubin by the biliary tract, it will not reach the intestine, and no urobilinogen will be formed. Bilirubin accumulating in the plasma imparts to it a distinctly yellowish color, the depth of which is proportional to the rate of blood destruction. Jaundice occurs if this hyperbilirubinemia persists for sometime. The presence of bilirubin in the serum is best

demonstrated by the *van den Bergh test*, and the quantity determined by the *icteric index* of the serum

Pneumonia produces a mild grade of anemia, with a more marked diminution in the hemoglobin than in the red cells. Of 300 cases examined, 55 per cent showed less than 80 per cent hemoglobin and 4,000,000 red cells per cubic millimeter, and 25 per cent of the children less than 60 per cent hemoglobin and 3,000,000 red cells per cubic millimeter

Infants were consistently more anemic than children, particularly as a result of *lobar pneumonia* in comparison with bronchopneumonia. The anemias that were observed as a result of pneumonia appeared to develop as a result of the cumulative infectious process at the beginning of convalescence, and this was out of proportion to the diminished nutritional intake during the active stage of the infection

The activity of blood regeneration in response to pneumonic processes was indicated by the presence of immature and nucleated erythrocytes to about the same extent in bronchopneumonia as in lobar pneumonia. With the exception of several severe cases with septicemia, most of the cases of pneumonia observed showed no signs of increased blood destruction

Acute otitis media produces a mild anemia as a result of depressed myeloid function. There is no evidence of blood destruction

Congenital syphilis in infancy produces a mild but persistent hydrochromic anemia, an anemia due to depression in the rate of regeneration of hemoglobin and red cells. From the number of cases studied, it appears that infants born with syphilitic manifestations show severe grades of anemia,

while infants revealing syphilitic manifestations only after several weeks of life show relatively mild but persistent anemia. The less marked the clinical characteristics of syphilis, the less severe the anemia. Severe grades of anemia are associated with visceral and bone syphilis. Antisyphilitic treatment exerts no influence for some time in the severe grades of anemia associated with visceral and bone syphilis

Tuberculosis in childhood produces none of the severe grades of anemia that are observed in other chronic infectious diseases. Normal hemoglobin values may often be seen in the course of active milary tuberculosis. The anemia is due to a diminution in the rate of regeneration in hemoglobin and red cells as a result of toxic injury from the tuberculous infection. Tuberculous involvement of the bone and peritoneum usually produces a more severe grade of anemia

Chronic nephritis does not result in manifestations of anemia until several weeks have elapsed after renal injury. The anemia is due to diminished erythrocytic function wherein the rate of replacement of red cells falls short of the usual normal rate of blood destruction. There is no evidence that hydremia is responsible for the anemia of chronic nephritis. The severity and chronicity of the anemia appear proportional to the toxic injury responsible for the renal involvement.

Sepsis shows a rapidly developing anemia of low color index. The reticulocyte count is usually diminished, the plasma pigment gradually increased to the extent that bilirubin gives a prompt diazo reaction, probably indicating liver damage due to focal lesions resulting from the septic process. Under such conditions, the direct diazo reaction

fails as an index of blood destruction, because bilirubin of hepatic origin will give the prompt diazo reaction even if there is at the same time an increase in the bilirubin due to blood destruction. Hemolytic substances, however, are present in the blood in septicemia due to *Streptococcus hemolyticus*, but are not present in the bacteremia due to *Streptococcus viridans* in subacute bacterial endocarditis.

GAUCHER'S DISEASE.—This, according to O Reiss and K Kato (Am J Dis Child 43 365 (Feb) 1932), may be defined as a familial, chronic, constitutional, nonhereditary disease of metabolism, which is characterized by the deposition of cerebroside kersin in certain cells of the reticulo-endothelial system. Clinically, it is revealed by splenohepatomegaly, without ascites, occasional lymphadenopathy, subicteric pigmentation of the exposed parts of the skin, pinguicula-like thickening of the ocular conjunctiva, hemorrhagic diathesis, unique changes in the bones, a hypochromic type of anemia, slight but early leukopenia, frequent thrombocytopenia and spastic irritative contractions and tremors of a central type.

Two cases of Gaucher's disease reported by Reiss and Kato had manifestations resulting from involvement of the central nervous system. The syndrome consisted of converging strabismus, difficulty in focusing of vision, generalized spasticity especially noticeable in the extremities, bilateral ankle clonus, convulsive seizures, painful and stiff neck, coarse uncontrollable tremors and increased muscle and tendon reflexes, without Babinski or Oppenheim signs. The authors suggest that these manifestations may possibly be due either to extension of Gaucher's cells

into the tissues of the central nervous system or to the phagocytosis or storage of Gaucher substance in the reticulo-endothelial elements of the brain and cord.

The blood picture is fairly characteristic, according to Reiss and Kato, although not pathognomonic. The red cells are slightly reduced in number, while the hemoglobin may be as low as from 35 to 50 per cent, indicating a *chlorotic* or *hypochromic* type of anemia. There is usually a slight but early leukopenia, with a practically normal differential count. There is no tendency for erythroblastemia or reticulocytosis. The platelet count may be low. Where chemical examinations of the blood have been made, the total non-protein nitrogen, calcium, creatinine, uric acid and phosphorus were normal. In a few instances a slight hyperglycemia was present.

Diagnosis.—A Sokolowski (Polska gaz lek 11 197 (Mar 13) 1932) obtained Gaucher cells from the marrow of the manubrium. The author states it may not be necessary to perform splenic puncture as long as the bone-marrow of the sternum contains the characteristic cells. The Gaucher cells vary considerably in size. According to Reiss and Kato, they are round or oval when isolated, but when large compressed areas are found, the cells are usually fused into long strands or united as syncytial masses. They show a strong affinity for acid stains, which bring out clearly a network of fine fibrils running in a wavy parallel course in the direction of the longitudinal axis of the cells. This gives the cell its streaked or wrinkled appearance, but when the cell has been cut transversely to the main direction of the fibrils, the cytoplasm appears granular or stippled.

In many of the cells, irregularly shaped or elongated, are colorless areas bounded by the fibrils which have been crowded apart. The shape of these colorless spaces is an important point of distinction between the Gaucher cells

with such fat stains as sudan III. Furthermore, in Gaucher's disease the blood phosphates, cholesterol and total fatty acids are also normal or may be lower than normal, a fact differentiating the disease from Niemann-Pick's disease.



X-ray of both femora, including hip-joints, showing typical changes described in text (Reiss and Kato: *Am. J. Dis. Child.*)

and the cells seen, *e.g.*, in lipoid histiocytosis, diabetic lysema, or in animals fed with cholesterol. In the latter conditions, the colorless spaces or vacuoles are rounded and contain a lipoid substance that gives a positive reaction

The x-ray examination of bones offers definite diagnostic aid. Reiss and Kato (*loc. cit.*) point out that of all the bones in the body, the femur shows the most typical changes. The change in the lower end, most frequently seen, consists

of the presence of areas of rarefaction of various sizes, which in some cases are intermingled with areas of sclerosis. The cortex is thin and extremely irregular, especially toward the middle portion of the diaphysis. The most interesting change is that of the bilateral swelling or fulness of the shaft just above the condyles, most pronounced on the medial side. This distorted and abnormal configuration of the lower third of the femur, when properly correlated with other findings, may be regarded as a diagnostic sign of Gaucher's disease. The same changes are seen in practically all other long bones, and the pelvis, skull and vertebræ may also be involved.

Prognosis.—The disease is essentially chronic, and in cases in which involvement of organs is moderate, life may be prolonged to a fair old age. Resistance to infection, however, is low. Although it is usually stated that the disease itself is seldom a cause of death, it is quite possible, according to Reiss and Kato, to conceive of death following an extreme cachexia, directly referable to the pathologic process.

SICKLE CELL ANEMIA — Sixty-four cases of sickle cell anemia have been reported in the literature, to which 10 additional cases have recently been added by L. W. Diggs (South M J 25 615 (June) 1932). According to the writer, this condition is the most common primary blood dyscrasia in negro hospital patients. Sickle cell anemia, W. W. Anderson and R. L. Ware (J A M A 99 902 (Sept 10) 1932) state, is a disease of *young* people. The average *age* of the reported cases is 13 years. Only 5 cases, according to Anderson and Ware, have been reported in persons over 30 years, although 1 case occurred in a patient 62 years of age. The youngest patient whose case

history was reported was 7 months old. The low age incidence is explained by the fact that these patients have a decreased resistance to disease and usually succumb early to respiratory or other infections. *Males* are affected more than females, the ratio being about 2 to 1.

Diagnosis and Symptoms — The diagnosis of sickle cell anemia, Diggs emphasizes, cannot be made merely on the presence of sickled cells. The anemia must be associated, and, moreover, it must be a hemolytic type with active regenerative signs. The presence of the sickle cell trait in association with secondary anemia, which often occurs in hospital patients as a result of infection, faulty nutrition or cachectic diseases, likewise does not make the case one of sickle cell anemia, but merely secondary anemia superimposed on the sickle cell trait.

From an analysis of the cases reported in the literature as well as of his own cases, Diggs states that the characteristic features of the blood picture in this type of anemia are as follows: (a) the presence of sickled cells in moist preparations, (b) signs of red blood cell destruction (poikilocytosis, degenerative forms, microcytes, increased serum bilirubin, negative direct van den Bergh and positive indirect, urobilinuria, phagocytosis of erythrocytes by large mononuclears), (c) signs of increased regenerative activity on the part of bone marrow (megaloblasts, intermediary forms, nucleated red blood cells, nuclear fragments of all types, diffuse basophilia, macrocytes, increased reticulocytes, leukocytosis with a shift right and left, increased platelets).

The average red blood cell in sickle cell anemia is smaller than normal. The cell volume is decreased out of propor-

tion to the decrease in red blood cell count and hemoglobin. The color index is variable, but usually below 1. The erythrocytes in sickle cell anemia are more resistant to hypotonic salt solution than normal.

According to the author, typical sickled cells, although striking and unmistakable in fixed smears and fresh moist preparations from some cases, are the exception rather than the rule.

The signs and symptoms of sickle cell anemia and their frequency of occurrence have been determined by Anderson and Waite (*loc cit*) from an analysis of the literature.

<i>Symptoms</i>	Per Cent
Abdominal pain	55
Joint pain	51
Weakness	41
Vomiting	28
<i>Physical Signs</i>	
Greenish-yellow sclera	78
Heart murmur	75
Adenopathy	55
Enlarged liver	53
Enlarged heart	48
Pathologic changes in lung	39
Ulcer or scar of leg	39
Fever	33
Enlarged spleen	30
Infantile genitalia	17
<i>Laboratory Results</i>	
Fragility decreased (68 per cent of the 35 cases in which fragility was determined)	68
Nucleated red cells present	57
Indirect van den Bergh positive	55
Urobilinuria	42
Direct van den Bergh positive	12

The paroxysmal *abdominal pain*, according to F. E. Lievy and T. Schnabel (Am J Med Sc 183 381 (Mar.) 1932), cannot be adequately explained by the current theories. It is quite possible, according to these authors, that a single explanation may not apply for all of the critical abdominal episodes as

they occur in sickle cell anemia. On the basis of bony changes in the vertebrae of one of these adult cases, they suggest that root pains may be the cause of the paroxysmal crisis of pain and rigidity.

ANESTHESIA. —PREMEDICATION.—*Anesthetic premedication*, according to J. S. Lundy (J A M A 99 968 (Sept. 17) 1932), has been widely used and abused. Whereas a mild effect is desirable, a profound effect is undesirable. This usually applies to morphine, the barbiturates and tribromethyl alcohol. Preliminary medication should be begun from 3 to 12 hours before operation, with the idea of eliminating fear and apprehension, and ordinarily not for the purpose of producing analgesia. In surgical cases, drugs of relatively short action that produce sedation are better than hypnotics of longer action. Considerable work has been done along these lines. A recent advance in this field is the development of **pentobarbital sodium**, which, like other barbiturates, is antispasmodic, and for this reason, as well as for purposes of sedation, is advantageously given before the administration of local anesthetics. **Tribromethyl alcohol** has given considerable satisfaction in the hands of many, but the tendency at first was to give it as an anesthetic, later, to give it as a basic anesthetic, and, finally, still further reduction of the dose tended to place it in the category with the combination of barbiturates and morphine, by its use more as preliminary medication than as an anesthetic agent.

In the use of **paraldehyde** in pre-anesthetic medication, S. Rowbotham (Brit M. J. 2. 693 (Oct. 17) 1931) divides the patients into 4 groups and varies the treatment as follows:

Group 1 Children under 7 years of age and debilitated or severely toxic subjects one dram (4 Gm) of paraldehyde per 14 lb (6.3 kilos) of body weight is given by rectum three-quarters of an hour before the operation. Each dram of paraldehyde is dissolved in 10 drams (40 cc) of warm saline solution. If the patient becomes unconscious during the administration of the drug, it is stopped at once.

Group 2 Normal adults and children over 7 years of age one-fortieth grain (0.0016 Gm) of morphine per 14 lb (6.3 kilos) of body weight is administered 1½ hours before the operation and followed after 15 minutes by the dose of paraldehyde given in cases of Group 1.

Group 3 Alcoholics, athletes over 25 years of age, patients who are very nervous a full dose of bromide and chloral is given the night before the operation. Morphine and paraldehyde are administered as in the cases of Group 2, but from ¼₁₅₀ to ¼₁₀₀ grain (0.00045 to 0.00065 Gm) of hyoscine is added.

Group 4 Thyrotoxic patients. The patient is tested to hyoscine. Chloral, bromides, and morphine-hyoscine are given as in the cases of Group 3. As it may be necessary to employ ether, the paraldehyde is dissolved in olive oil and this solution is used. If the patient is awake ½ hour before the operation, from ½ to 2 ounces (15 to 60 cc) of a 50 per cent mixture of oil and ether is instilled in the rectum. Retention of the mixture is aided by a 10-grain (0.65 Gm) suppository of chloretone.

Avertin is contraindicated by diseases of the liver, kidneys, and rectum, and by advanced pulmonary tuberculosis. Its use is rarely followed by restlessness or vomiting.

The barbiturates may be given by mouth or intravenously. Intravenous administration is more accurate and certain than oral administration. When morphine is given, the action of barbiturates is increased and smaller doses produce unconsciousness. As a rule, the systolic blood-pressure is lowered from 20 to 30 points or more after the intravenous administration of a barbiturate. The barbiturates are probably broken up by the liver and excreted through the kidneys. The 3 most commonly used are amytal, nembutal, and pernocton. All act quickly, but nembutal and pernocton are twice as toxic as amytal and hence act much more quickly than the latter. These drugs should be given intravenously and in the minimal dose required to produce unconsciousness. As a rule, very little anesthetic is needed. Vomiting is very rare, and recovery usually takes place in from 2 to 6 hours.

The author prefers paraldehyde or nembutal as a basal narcotic.

PHYSIOLOGICAL ACTION.—

The influence of various types of anesthesia on the *alkali reserves of the blood* has been studied by Provenzano (Bol inst de clin quir (nos 59-60) 7 321, 1931) who draws the following conclusions:

- 1 The acid-base equilibrium of the organism should be determined before and after all major surgical operations.

- 2 This is done most accurately by determining the hydrogen-ion concentration and the alkali reserve of the blood by the methods of Cullen and Van Slyke and Cullen, which indicate quantitatively the degree of deviation toward acidosis or alkalosis.

- 3 The determination of the hydrogen-ion concentration of the blood is of little interest to the clinician because the

variations in this concentration are slight and, appearing late, do not reveal the first degrees of acidosis or alkalosis

4 The most practical procedure for the clinician is the determination of the alkali reserve, which will demonstrate the presence and degree of an acidosis or alkalosis

5 The indirect or functional methods, such as determinations of the alveolar carbon dioxide and urinalysis, give merely approximate values and are of value only to confirm the findings of the determination of the alkali reserve

6 In surgery it is essential to know, in addition to the alkali reserve, the content of chlorides and urea in the blood and the acidity, the organic acid index of Van Slyke and Palmer, and the ammonia content of the urine

7 An exact knowledge of the acid-base ratio will enable the surgeon to judge the type of anesthetic that may be used with minimal risk of complications due to acidosis or alkalosis

8 General anesthesia induced with ether produces a marked decrease in the alkali reserve. Spinal anesthesia has the same effect to a less degree.

9 Local and regional anesthesia do not produce an appreciable change in the acid-base balance.

10 The principal cause of the decrease in the alkali reserve resulting from general or spinal anesthesia is probably the hypotension of the blood produced by these types of anesthesia which causes a concentration of hemoglobin in the blood with retention of alkali in the tissues and a corresponding decrease of alkali in the blood

11 The administration of carbon dioxide by the method of Henderson during general anesthesia and after operation will greatly reduce the fall in the alkali reserve and prevent anesthetic

syncope by its stimulating and regulating action on the respiratory centers

12 The postoperative states of acidosis and alkalosis can be easily diagnosed by the study of the alkali reserve and the supplementary measures cited, and can be combated successfully by treatment appropriate to the particular case

Induced by the studies of Ipsen and Foged, who had found that the *skin temperature* during operations gives indications for the postoperative course, Mayer (Deutsche Ztschr Chir 236 49 (May 17) 1932) studied this problem on 196 patients. He found that, normally, anesthesia increases the skin temperature and that this is most clearly noticeable on the sole of the foot. The increase is due to a dilatation of the cutaneous arteries, especially of the arterioles. Under the influence of ether-oxygen anesthesia, which in some instances was deepened by the administration of a few drops of chloroform, the skin temperature increased on the average by about 5° C. In combined avertin and nitrous oxide-oxygen anesthesia, the skin temperature likewise increases by about 5° C. The increase is more rapid than in ether anesthesia. In spinal anesthesia the temperature increase follows immediately after the injection of the anesthetic. Under the influence of local anesthesia, there is, as a rule, no temperature increase, only occasionally increases from 4 to 6° C. being noted. In regard to the *prognostic significance* of the skin temperature during anesthesia, the author states that an increase (positive Ipsen's anesthesia phenomenon) indicates a favorable prognosis. Deviations from the normal anesthesia reaction (negative Ipsen's anesthesia phenomenon) indicate an unfavorable prognosis.

TABLE I
CHART OF 400 ABDOMINAL OPERATIONS

Number of cases	100	100	100	100
Age	18-40 years	20-40 years	20-50 years	19-50 years
Sex	Male	Male	Male	Male
Season	Nov-Feb	Nov-Feb	Nov-March	Nov-March
Anesthetic agents	N ₂ O + O ₂ + E	N ₂ O + O ₂ + E	E or ethyl chloride and ether	E or ethyl chloride and ether
Operation	Exploratory laparotomy	Exploratory laparotomy	Exploratory laparotomy	Exploratory laparotomy
Prophylactic CO ₂	Used in theater and ward	Not used	Used in theater and ward	Not used
Respiratory sequelæ	4 cases	10 cases (4 being serious)	8 cases	12 cases (5 serious)
Therapeutic CO ₂	Used for 24 hrs	Not used	Used for 24 hrs	Not used
Result	All rapidly recovered	1 atelectasis, 3 pneumonia, 1 died	All rapidly recovered	1 massive collapse, 4 pneumonia, 2 died
Average illness	36 hours	4 days	48 hours	5 days
Mortality	0 per cent	1 per cent	0 per cent	2 per cent

Note—The term "exploratory laparotomy" included cases of partial gastrectomy, gastroenterostomy, appendicectomy, cholecystectomy, and excision of duodenal ulcer. The respiratory complications appeared within 36 hours of the operation, and the diagnosis was confirmed, in the serious cases, by radiology, and in the postmortem room.

COMPLICATIONS—Respiratory—J R Mackenzie (Brit M J 1 561 (Mar 26) 1932) reports the experience in 5000 cases in which carbon dioxide was administered in combination with general anesthesia. Among the advantages that accrue to the surgical patient, 3 stand out prominently (1) the prophylactic action of carbon dioxide against the onset of respiratory complications, irrespective of the anesthetic agent, (2) the protection afforded to patients who come up for operation with concomitant respiratory disability, and (3) the curative action of carbon dioxide when postanesthetic respiratory complications have occurred. For purposes of observation, the cases are arranged in 4 groups. In the *first* and largest *group*, carbon dioxide to the extent that appeared advantageous to the patient was administered in the operating room, during the induction, the maintenance, and the recovery stages of gas, oxygen and ether anesthesia. In the *second group*, carbon dioxide was used in the induction and recovery

stages of deep ether anesthesia. In the *third group*, carbon dioxide was used as a prophylactic against respiratory complications during the recovery stage of anesthesia in the operating room and in the ward after the operation. In the *fourth group*, carbon dioxide was administered as a therapeutic agent in cases of postanesthetic respiratory complications. The tendency has been for the first 3 groups to merge into one, and recently, as far as it has been possible, the patients have had carbon dioxide during the induction of and recovery from anesthesia, in the operating room and in the ward, at regular intervals throughout the first 24 to 36 hours after the operations as outlined.

The author has evolved the following technic of administration:

(1) Pulmonary ventilation is controlled and regulated to the normal during the induction and maintenance of anesthesia. (2) During the closing stages of the operation, hyperventilation and deëtherization is carried out until the patient leaves the operating room. (3) In the ward the administration consists of the inhalation of carbon dioxide and oxygen for

5-minute periods. These periods are continued at intervals of from 4 to 6 hours after the operation. (4) This periodic administration is continued if there is any evidence of respiratory complications. The percentage of carbon dioxide, the duration of the period, and the frequency of administration should be regulated according to the toleration of the individual patient. The apparatus used in the ward consists of a small platform on casters to carry 1 cylinder of carbon dioxide and 1 cylinder of oxygen, with a central standard to carry a sight feed bottle. It has proved eminently simple and satisfactory. The freedom from pain in abdominal wounds during hyperventilation with carbon dioxide as compared with the pain and distress which the patient endures in voluntary deep breathing is a marked feature of the administration.

Treatment.—According to F. E. Shipway (Brit J Anesth 9 69 (Jan) 1932), there are many causes of respiratory and circulatory paralysis. In general, the use of carbon dioxide and oxygen, both for their prevention and, combined with artificial respiration, for their treatment, is to be encouraged. **Partial inversion** is of use in the absence of asphyxia, it should be adopted at once for the treatment of primary circulatory syncope. If the action of the heart cannot be restored by these means, **puncture of the auricle**, followed, if necessary, by **direct massage**, should be performed. If the abdomen is already open, **subdiaphragmatic massage** may be carried out, if not successful within 2 minutes, direct massage must be undertaken. Artificial respiration must be maintained throughout until natural breathing is restored. The time factor is all important. Circulation must be restored within 5 minutes of the time of arrest. During all attempts at resuscitation, the body temperature of the patient must be maintained.

ANESTHETIC DRUGS.—Avertin.—This anesthetic seems to be widely

used both in this country and abroad. K. Schlaepfer and L. M. Peters (Arch Surg 24 868 (May) 1932) state that European literature contains reports of about 400,000 cases since its introduction 3 years ago. According to J. S. Lundy (J A M A 99 968 (Sept 17) 1932), as more and more patients are anesthetized with avertin, it is being shown that a dose large enough to produce anesthesia should seldom be used. Avertin tends to be used more as a preliminary medicament, to be followed by a local anesthetic, or by a general anesthetic given by inhalation in a reduced dose.

A report of observations in 300 consecutive cases in which avertin was used in gynecology is outlined by R. Peterson and J. M. Pierce (Surg Gynec Obst 55 191 (Aug) 1932) in the following summary (Table II).

F. W. Marvin (New England J Med 206 609 (Mar. 24) 1932) believes that avertin should be used only as a *basal anesthetic* and should be given only by a well-trained anesthetist or under his direction. Every detail of technic should be executed accurately. Carelessness will be penalized by morbidity and mortality. It causes a peaceful, quiet and rather rapid induction with early relaxation. The amount of ether or nitrous oxide used as an adjunct is greatly reduced. It should be used alone, and not in combination with other drugs whose synergistic action might produce serious complications.

Results and Advantages.—E. F. Goldschmidt and A. M. Hunt (Am. J. Surg. 15 1 (Jan.) 1932) present their experiences with 314 *basal anesthetics* with avertin administered to 225 patients. The drug was instilled by rectum as a 25 per cent solution in distilled water, usually in doses varying

TABLE II
SUMMARY OF CASES

No of Cases	Type of Operation	Avertin Only	Avertin Plus N ₂ O	Avertin Plus Ether	CO ₂	Stimulants Necessary	
						Caffeine Sodium Benzoate	Ephe-drine
31	Panhysterectomy ± single salpingo-oophorectomy or bilateral salpingo-oophorectomy	21	9	1	12	10	2
58	Subtotal hysterectomy ± single salpingo-oophorectomy or bilateral salpingo-oophorectomy	32	25	1	10	12	8
95	Plastic	68	27	0	3	17	9
34	Sterilization (abdominal)	19	15	0	0	2	0
31	Salpingo-oophorectomy	15	16	0	0	2	5
6	Shortening of round ligaments	6	0	0	0	1	0
4	Exploratory laparotomy	3	1	0	0	0	0
3	Radical panhysterectomy	1	0	2	0	0	0
4	Laparohysterotomy and sterilization	2	2	0	0	0	0
2	Colpotomy	1	1	0	0	0	0
15	Vaginal hysterectomy	9	6	0	0	3	1
11	Vaginal sterilization	5	6	0	0	0	0
1	Vaginal oophorectomy	0	1	0	0	0	0
1	Abdominal drainage	1	0	0	0	0	0
2	Therapeutic abortion	1	1	0	0	0	0
1	Ureteral transplant	1	0	0	0	0	0
1	Excision of Bartholin cyst	1	0	0	0	0	0
300	Total	186	110	4	25	47	25
300	Percentage	62	36 66	1 33	8 33	15 66	8 33
172	Laparotomies						
	Cases	100	68	4	22	27	15
	Per cent	58 14	39 54	2 32	12 81	15 69	8 72
128	Vaginal operations						
	Cases	86	42	0	3	20	10
	Per cent	67 18	32 81	0	2 41	15 62	7 81

Maximum dose of avertin, 110 milligrams per kilogram of body weight

Minimum dose of avertin, 90 milligrams per kilogram of body weight

Average fall in systolic blood-pressure in 300 cases, 37 millimeters mercury

Average fall in diastolic blood-pressure in 300 cases, 20 74 millimeters mercury

Average increase in respiratory rate in 300 cases, 10 3 per minute

Postoperative complications due to anesthetic: rectal irritation, none, liver damage, none, pneumonia, none

Deaths none

between 0 08 and 0 1 Gm ($1\frac{1}{4}$ and $1\frac{1}{2}$ grains) per kilogram ($2\frac{1}{5}$ pounds) of body weight, to patients of both sexes between the ages of 2 and 73 years, for operations requiring surgical anesthesia. Parenchymatous liver damage and extensive bilateral kidney disease are the only contraindications for the

use of this anesthesia. It is concluded that, administered in sufficient doses, no less than 0 08 Gm ($1\frac{1}{4}$ grains) per kilogram ($2\frac{1}{5}$ pound) of body weight, avertin fluid produces a good basal anesthesia. In only about 3 5 per cent of the cases was a satisfactory action not observed. In about 24 per cent full

surgical anesthesia was obtained, in about 20 per cent the basal anesthesia was supplemented with local anesthesia (procaine), in the remaining cases ether, ethylene, oxygen, nitrous oxide, oxygen or a combination was employed at various phases of the operation. In all instances, the necessary dose of the supplemental inhalation anesthetic, however, was only a fraction of the amount usually required for the operation performed. A temporary fall in the systolic blood-pressure of about 19 mm of mercury in men and 28 mm in women occurred following the instillation. Studies with the cardi tachometer of Boas showed that the abrupt changes in heart rate produced by excitement at the beginning and the end of the anesthesia were markedly reduced or practically absent. The most striking of the advantages in the use of this basal anesthesia is the complete amnesia observed in all patients, they having no recollection whatever of the events following the instillation of the avertin.

According to J. Young (Brit M J (Dec 5) 1932), avertin is a valuable addition to the drugs at the disposal of the anesthetist. In his experience with avertin in gynecology in over 1000 cases, the author stresses the comfort of induction of the anesthetic, with complete amnesia. Postoperative distress and morbidity are considerably reduced, as are also postoperative pulmonary complications. In no case was there any paralytic ileus or dilatation of the stomach. He states that it is not uncommon to find a drop of 20 to 30 mm. Hg. in systolic blood-pressure and in cases of hypertension, the fall may be as great as 100 mm Hg. It commences with induction and usually reaches its maximum within 15 to 20 minutes. The fall in the blood-pressure, however, is of no

practical significance and gives rise to no anxiety. Often the pressure is quickly restored spontaneously or after the administration of the ether is begun. It is quickly readjusted by the hypodermic injection of 0.5 cc (8 minims) of **ephedrine hydrochloride solution**.

Slowing and reduction in the amplitude of the respiration is common, but causes no harm. Where severe, it is at once readjusted by the administration of **carbon dioxide**. A minor disadvantage of avertin is the headache following the anesthesia sometimes complained of by patients. It is readily controlled by **pyramidon**, 5 grains (0.3 Gm.), repeated after 4 hours if necessary, although 1 dose usually suffices.

In summarizing the use of avertin fluid anesthesia in surgery and commenting on their results in 100 cases, Schlaepfer and Peters (*loc cit*) state that ill effects have not come to their attention. Avertin should not be given in acute respiratory infections. The contraindications are severe kidney and liver damage. Smaller doses must be given to cachectic, very obese persons and to those with chronic ileus. The authors state that narcosis is deeper and longer in the anemic and in the fasting patient.

Hypodermoclysis immediately after operation restores blood volume and shortens narcosis from 1 to 1½ hours.

The authors mention 2 mortalities, not attributable, however, to avertin anesthesia. Both deaths occurred in dehydrated patients, who in any event were likely to succumb, one suffering from perforated gastric ulcer, 28 hours old; the other, a patient with intestinal obstruction from annular carcinoma of the sigmoid.

Schlaepfer and Peters quote Ausehutz who states that the mortality of

avertin anesthesia in experienced hands is 1 death in 10,000

Carbon dioxide has been used to produce anesthesia, but its best application is not as an anesthetic, according to Lundy (*loc cit*), but for the purpose of regulating the depth of respiration. This has been a distinct advance in dental, surgical and medical cases. The use of carbon dioxide diluted with nitrous oxide, ethylene or oxygen frequently has helped to control nausea and vomiting in cases in which general or spinal anesthesia has been used. It has been used to advantage in the control of postoperative and nonoperative cases of hiccup, and in some cases its use has made possible the avoidance of straining during gas anesthesia, without the use of ether in addition to the anesthetic gases. When ether is used for admixture, carbon dioxide facilitates the absorption of ether and hastens the induction of satisfactory anesthesia. Lundy thinks that the postoperative administration of carbon dioxide and oxygen for hyperventilation is a distinct advance in lessening postoperative pulmonary complications.

Chloroform Administration.—An original clinical method of giving chloroform is brought out by S. T. Rowling (*Brit. J. Anesth.* 9:59 (Jan.) 1932). Vaporized by the author's method, chloroform acts as the corrective and adjuvant of ether. It gives a rapid induction without discomfort, prevents ether irritation, and aids subsequent relaxation. It is available at any time during the administration and in any reasonable percentage dose. It is safe because the dosage is known and limited, its administration is under complete control, an excessive dose is impossible, and because it is administered mixed with oxygen and carbon dioxide and

combined with ether. These factors render the administration of chloroform by this method a totally different thing to its administration in irregular unknown percentages on an open mask. The amount used is small—during the induction period it does not exceed $\frac{1}{2}$ dram (2 Gm.) and when used during the maintenance period it does not exceed 2 drams (8 Gm.) for a long administration. The fear of delayed chloroform poisoning need not be considered. During every administration there are 2 danger periods: initial overdose into the blood, and cumulative overdose into the tissues. By changing the anesthetic atmosphere to ether plus oxygen plus carbon dioxide during the first danger period, the danger of chloroform is eliminated, and by giving a minimal percentage of chloroform vapor plus ether plus oxygen plus carbon dioxide, the danger of a cumulative overdose into the tissues is again eliminated. It is during the early induction period that the vaporized chloroform is of the greatest benefit, it is also available later, if desired, the chief indication being when ether is not taken well, when the patient is rigid, or when the patient is bronchitic and a minimal percentage of ether must be given. The method has had an exhaustive clinical trial and is found to be simple, efficient and safe.

UNTOWARD EFFECTS.—I. G. W. Hill (*Lancet*, 1:1139 (May 28) 1932) states that disturbances of cardiac action which generally elude clinical observation can be detected electrocardiographically during chloroform anesthesia. They occur in about 50 per cent of cases and are of the nature of multiple ventricular extrasystoles. These, on occasion, may be very numerous, and the condition then resembles the multiple

ventricular tachycardia so characteristically found in the cat, and well known as a precursor of fatal ventricular fibrillation. The author believes that the danger of chloroform for induction probably lies in its tendency to produce these disturbances.

The mortality in *delayed chloroform poisoning* is given by H J Stander (Am J Obst and Gynec (June) 1932) as 80 per cent. Intravenous dextrose therapy and antiacidosis measures, such as sodium bicarbonate intravenously, offer the only hope of recovery. The author believes that chloroform should not be used in any surgical procedure except by an expert anesthetist especially schooled in its use. The only place for chloroform in obstetrics is late in the second stage, when it should be administered in whiffs (*anesthesia a la reine*), and even then it should be used only when no other anesthetic is available or indicated.

Ether.—ENDOTRACHEAL INHALATION—*Technic*—According to G Kaye (M J Australia 1 684 (May 14) 1932), endotracheal inhalation anesthesia necessitates the use of a catheter so wide as practically to occlude the glottis but not so large as to do injury. This catheter provides an ample airway but prevents any inhalation of air between the catheter and the walls of the larynx. This is necessary for 2 reasons: (1) to prevent dilution of the anesthetic with air, and (2) to obviate the risk of aspiration of foreign matter from the pharynx into the trachea, since the return current of air which is a feature of the insufflational technic is absent here. When much blood may lie free in the pharynx, the latter may be packed closely around the catheter with gauze, all apprehension regarding aspiration into the trachea being thus re-

moved. The catheter, once inserted, is practically an extension of the trachea and obviates all possibility of expiratory obstruction due to the presence of blood or mucus in the pharynx or to falling back of the tongue.

In the original technic, the catheter was connected to a piece of rubber tubing of suitable length and caliber, at the end of which was attached a source of supply of ether vapor, for example, the bowl of a Clover's inhaler or a perforated tin containing ether. In this way air was inhaled and exhaled by the patient across the surface of ether in the container. Considerable care was necessary lest fluid ether reach the air passages. A more elegant technic is supplied by an adaptation of Magill's method for the endotracheal inhalation of gaseous anesthetics.

Air supplied from a motor blower or other source is passed across the surface of ether in a container suitably equipped with a tap for the control of the ether concentration and with a guard bottle. The ether-laden air then enters a small rubber bag serving as a reservoir. It next passes, by means of a metal elbow piece, to the proximal end of the catheter. Interposed between the bag and the elbow piece is an exhaling valve so contrived that the patient inhales air from the bag and exhales through the valve. Rebreathing occurs only in the catheter and not in the bag, unless the exhalation tension of the valve is adjusted for this purpose.

UNTOWARD EFFECT—*Ether convulsions* occurring in a girl, aged 7, following appendectomy, is reported by A Daly (Brit J Anesth 9.67 (Jan.) 1932). Just as the peritoneum was about to be closed, *i.e.*, after 30 minutes' anesthesia, clonic convulsions started in the face and jaws and spread rapidly to

the rest of the body. The anesthetic was at once stopped and carbon dioxide and oxygen were given from a bag through valves, in order to hasten the elimination of ether, but the convulsions continued and the abdomen was closed with difficulty between spasms. As the child looked hot and her face was flushed and congested, the head of the table was raised, with the idea of relieving any congestion of the brain. The convulsions at once ceased and did not recur. The child was returned to bed and the head was kept well up for some hours. There were no further spasms, and, beyond the fact that the pulse next day was 140 and remained about 100 for 3 days, recovery was uneventful. The author believes that, whatever may be the cause of the convulsions, their treatment by raising the head is certainly worth a trial.

According to W. L. Mendenhall and R. Connolly (J. Pharmacol. and Exper. Therap. 43:315 (Oct) 1931), pure ether is not particularly poisonous to ciliary action in oysters. Small amounts of aldehyde or peroxide in ether result in distinctly toxic effects on ciliary action. Respiration and circulation are not appreciably affected by the amounts of contaminants usually found in anesthetic ethers. Cilia paralyzed by small amounts of impurities in ether may offer an explanation for the development of pneumonia following surgical operations in which contaminated ether is used.

Ethyl Chloride.—DANGERS.—According to F. Dietel (Deutsche med. Wchnschr. 58:698 (Apr. 29) 1932), under certain conditions, ethyl chloride may become inflammable. The author admits that the likelihood of a fire is somewhat remote, but nevertheless thinks that the fire danger is sufficient to contraindicate the simultaneous use

of the ethyl chloride spray and the galvanocautery.

Ethylene continues to be widely used and has been generally satisfactory. As outlined by J. S. Lundy (*loc. cit.*), there have been a few accidents due to its inflammability, and no doubt their number will increase unless the generally recognized precautions incident to its use are observed. There are phases of the technic of using this agent to which the writer wishes to call attention. In addition to maintaining a high humidity and using grounding devices for the gas machine and other furnishings in the operating room, it is well to begin anesthesia with nitrous oxide and oxygen, and then to substitute ethylene for the nitrous oxide. At the termination of anesthesia all ethylene and ether are, or should be, flushed out of the machine with a mixture of nitrous oxide and oxygen, regardless of whether carbon dioxide has been used.

Nitrous Oxide.—A review of 553 cases in which anesthesia was induced with nitrous oxide and oxygen has been made by A. H. Macklin (Lancet 2:897 (Oct. 24) 1931), in order to determine the asphyxial element in gas oxygen anesthesia. With the exception of a few of the earliest cases in the series and several in which anesthesia was induced by the intratracheal method, no agents other than nitrous oxide, oxygen, and carbon dioxide were used. The operations varied.

In the induction stage and the post-operative period, nitrous oxide-oxygen anesthesia has great advantages as compared with anesthesia induced with ether or chloroform, but during the operative stage it has not shown such marked superiority. In one-third of the cases reviewed in which an operation was performed in the upper part of the ab-

domen, the anesthesia was not entirely satisfactory during the operative stage. However, if the matter may be judged from the crucial test of peritoneal suture, the incidence of unsatisfactory relaxation during the same period is about the same when ether is used. Of 16 cases in which anesthesia was induced by the intratracheal method, it was necessary in more than half the cases to use chloroform to obtain sufficiently lasting relaxation of the throat muscles.

Considerable preliminary medication was not found necessary or desirable. The average adult received $\frac{1}{6}$ grain (0.01 Gm.) of morphine sulphate, but in the cases of children it was believed better to omit preliminary medication.

In the majority of cases it is impossible to secure the necessary relaxation with nitrous oxide-oxygen anesthesia without producing some degree of cyanosis. With the use of chloroform, ether, or rectal or intravenous anesthesia, loss of color means an obstruction of the airway or failure of respiration or circulation, or both. It is a sign of serious trouble. The cyanosis of nitrous oxide-oxygen anesthesia, however, is totally different. Nitrous oxide is such a weak anesthetic that, in order to secure its maximum concentration in the blood, it is necessary to use oxygen instead of air. Even when the oxygen is reduced to the minimum necessary to maintain a pink color, the gas is of insufficient concentration to produce adequate anesthesia unless another anesthetic, such as ether, is added, heavy preliminary medication and local agents are used, or the pressure and concentration of the nitrous oxide are increased. The last procedure further reduces the percentage of oxygen in the mixture and

adds an asphyxial element, carbon dioxide, to the blood.

Factors which may be responsible for difficulty or danger in nitrous oxide anesthesia during the operative period are

- 1 *Acapnia*, which may result in respiratory failure. This must be prevented by adding carbon dioxide to the mixture of gases.

- 2 *Anoxemia* and an anoxidative state of the tissues. The amount of cyanosis is not an accurate index of the degree of these conditions.

- 3 The effect of anoxemia on the heart muscle. The danger of *cardiac failure* renders necessary the use of an apparatus capable of instantly correcting an overdose, great care in the induction of the anesthesia, the most alert attention during the whole operative period, and reduction of the total duration of the anesthesia to the minimum.

- 4 The complicated character of the apparatus.

During the postanesthetic period, uncompensated *acidosis* is of great importance. When anesthesia is induced with nitrous oxide-oxygen, the danger of this complication is less than after anesthesia induced with other agents, because of the rapidity with which changes in the depth of nitrous oxide anesthesia can be effected. Nitrous oxide-oxygen anesthesia is associated also with less postoperative vomiting and less danger of respiratory complications.

The author concludes that nitrous oxide-oxygen anesthesia may be employed in a large variety of cases without other agents, and that neither practically nor theoretically can a carefully controlled anoxemia be regarded as a contraindication to its use.

Sodium Amytal.—The results obtained by the intravenous use of sodium

amytal in 172 surgical operations are discussed by H Cabot, W G Maddock and H Lamb (Arch Surg 24 715 (May) 1932) As the drug was slowly injected, in from 3 to 5 minutes, the patients passed gradually, quietly and surely into what appeared to be a normal deep sleep No stage of excitement was observed The pupils contract early and will not react to light At first, the patient can be aroused by a needle prick or shaking As the administration is continued, these stimuli become less effective to a point simulating profound anesthesia During the administration of sodium amytal the pulse rate increased in 124 cases an average of 15 a minute, in 25 cases there was an average decrease of 12 a minute, while in 23 cases there was no change In 100 cases the respiratory rate increased on an average of 5.7 a minute, an average decrease of 4.3 a minute occurred in 31 cases There was no change in 41 cases The patient's color remained good if an effort was made to keep the upper respiratory passage unobstructed by holding up the jaw and inserting a breathing tube A fall in blood-pressure occurred in 166 cases during the administration of the drug, the average systolic reduction being 27 mm of mercury, while the average diastolic reduction was 15 mm Six cases showed a slight tendency toward increase in both systolic and diastolic pressures There was distinctly less change in the patient's blood-pressure if it was normal before the administration of the anesthetic, while persons with hypertension or hypotension showed a much greater reduction The ordinary operative trauma was a decided stimulus to the return of the blood-pressure to normal As a routine, the operation was started within from 3 to 5 minutes

from the time of completion of the administration of the drug Into the skin and parietal peritoneum, a local anesthetic was usually injected before incision No inhalation anesthetic was given until requested by the surgeon because of (1) occasional poor relaxation, (2) a tendency for the patient to squirm under the stimulus of the incision, or (3) handling of the viscera Sodium amytal alone was entirely satisfactory in 42 of the cases In 21 cases of this group, major abdominal operations were performed The intestine appeared to be collapsed and could be packed away from the operative field with more than the usual ease Exposure was ideal There was no increased tendency toward bleeding or oozing Facilities for closure were perfect The effect lasted well beyond the average time for the operation The remaining 130 cases required an additional anesthetic agent On the basis of their observations, Cabot, Maddock and Lamb draw the following conclusions (1) sodium amytal given intravenously is a satisfactory addition to the anesthetic armamentarium (2) It is an exceedingly agreeable form of anesthetic from the patient's point of view (3) In consideration of the fact that 75 per cent of the patients required an additional anesthetic, the authors raise the question as to whether smaller doses of sodium amytal plus the additional anesthetic would not be just as satisfactory as their nearly maximal dose This would effect a decrease in the length of time of postoperative narcosis and its consequent possible complications

Sodium amytal as a basal anesthetic is advocated by H K Ransom (Arch Surg 24 1044 (June) 1932). The author calls attention to the fact that sodium amytal administered intraven-

ously is a valuable basal anesthetic for nitrous oxide-oxygen. A better quality of anesthesia and more complete muscular relaxation can be obtained than with nitrous oxide and oxygen unassisted. A considerably higher percentage of oxygen is possible than with gas alone, thus tending to decrease the objectionable cyanosis and making for a greater margin of safety. The easy, quiet induction, along with the slow and gradual awakening, is appreciated by the patient. In nervous patients, or in cases of toxic goiter, the anesthetic can easily be given in the patient's room without exciting suspicion, thus greatly facilitating the "steal" type of operation. Postoperative nausea and vomiting are not greater than with nitrous oxide and oxygen unaided. There is usually an initial fall in blood-pressure amounting to 29 mm of mercury, or 22 per cent, which might be regarded as a contraindication to its use in certain cases, *e g*, shock. When used as a basal anesthetic with gas, the incidence of pulmonary complications is not increased.

According to E. E. Swanson (J. Lab. and Clin. Med. 17:325 (Jan.) 1932), protection is afforded by sodium amytal against intoxication of cocaine, picrotoxin and strychnine. The intravenous and oral administration of sodium amytal in the order named offers the more effective protection for all 3 poisons. Sodium amytal is an anti-convulsant as well as a detoxifying agent for the 3 poisons.

ENDOBRONCHIAL CLOSED ANESTHESIA.—Closed endobronchial anesthesia, according to J. W. Gale and R. M. Waters (J. Thoracic Surg. 1:432 (Apr.) 1932), has been employed in several experimental animals for the removal of different lobes of the

lung, and in one patient for the removal of a mediastinal tumor. Artificial respiration may be maintained in the one lung with perfect control of its respiration and minute-volume respiratory exchange. Intrapulmonary pressure is measured by a side tube to a manometer. The incorporation of the closed carbon dioxide absorption technic assures a warm moist anesthetic atmosphere at all times. The shock usually encountered on the sudden creation of an open pneumothorax has been slight. This has been demonstrated by the blood-pressure and pulse rate remaining constant. The irregular and violent respiratory movements, so often seen, have been replaced by slow, regular, and deep breathing. Exposure is simple for the surgeon because the lung in the operative field is immobile. Chances of infection are reduced because a sucking wound has been entirely eliminated. Little chance exists for infected secretions to be squeezed into the trachea because the bronchus is blocked. Although the method has been employed in a series of cases too small from which to draw conclusions, the evidence so far obtained gives promise that the closed endobronchial type of anesthesia is a most practical method for use in intrathoracic operations in which the pleural cavity must be opened.

INTRATRACHEAL INHALATION ANESTHESIA.—*Technic.*—The technic of this form of anesthesia is described by P. J. Flagg (Arch. Otolaryng. 15:844 (June) 1932), who has used it as a routine method during the last 4 years. In his hands, trauma has not followed this technic, and he believes this to have been partly due to each of the following factors: adequate ether relaxation, elimination of preliminary medication (morphine and

atropine), adequate exposure lubrication of the tube and the use of a mouth gag when intubating. In this technic, adequate suction must always be available for the best results. In order to reduce the irritability and the diameter of the intubated element, a pharyngeal gauze pack is preferred to an intratracheal balloon. Irritation is caused by the pharyngeal pack unless care and lubrication are employed in placing it. Experience has shown that the cough spasm following intubation may readily be controlled and its effects promptly met. The technic of intratracheal inhalation provides a functioning equipment for artificial respiration in the case of respiratory failure. Routine cocaineization was avoided, ether relaxation being employed instead. While any anesthetic agent may be employed, ether is the anesthetic of choice in the majority of cases. The opinion appears to be that intubation carried out in the manner prescribed by the author does not predispose to laryngeal tuberculosis in a case presenting pulmonary tuberculosis, and that the presence of the intratracheal tube, through the facilities afforded for suction of the trachea, provides one of the most efficient means of reducing postoperative morbidity in thoracic operations. It has been found that the method is indicated in all operations on the head and neck, and in any condition in which aspiration is to be avoided.

LOCAL ANESTHESIA.—Indications and Methods—R. P. Caron (Minnesota Med 15 8 (Jan) 1932) writes concerning intraabdominal local anesthesia and reviews some of the advantages, disadvantages and important technical points in the administration of intraabdominal splanchnic anesthesia, together with the neuroanatomy of the

viscera. He states that local anesthesia for intraabdominal operations is definitely applicable in cases in which general or spinal anesthesia is contraindicated, in cases of spinal anesthesia in which the anesthesia has waned, and is the method of choice in major abdominal procedures in all cases of prolonged debility from disease, and in the aged. Familiarity with the anatomy, and particularly the neuroanatomy, of the field of operation is essential before an attempt is made to adopt this method. Sympathetic anesthesia can be established by injecting the solution into the mesenteries, adnexal supports, subperitoneally and perivascularly.

A method of local anesthesia in gynecologic abdominal operations is described by J. Frigyesi (Monatschr. f. Geburtsh. u. Gynak. 90 65 (Jan) 1932), who designates his method as lower abdominal anesthesia. The technic of this new method is almost the same as in hypogastric nerve anesthesia, the only difference being that the 30 c c (1 ounce) of the 0.5 per cent solution of *procaine hydrochloride* is deposited on the lateral surface, not of the fifth but rather of the third lumbar vertebra. After describing the technic in detail, the author gives tabular reports of 112 surgical interventions in which he employed this method, *viz.*, in ventrofixations, in ventrofixations and appendectomies, in adnexotomies, in supravaginal amputations, in total extirpations of the uterus by means of laparotomy, in Wertheim's radical operation, in Cesarean sections and in vaginal operations.

Gynecologic laparotomies can be performed under local anesthesia with ease and dispatch only when the operative technic and the operating room personnel are, so to speak, attuned to it.

As such favorable conditions do not prevail in a general hospital, G Gellhorn (Am J Obst and Gynec 23 908 (June) 1932) has used local anesthesia in abdominal operations only in very exceptional cases. In vaginal operations, on the other hand, local anesthesia enters into the closest competition with other means of relieving pain and, in fact, becomes the method of choice. The operations concerned fall into 2 large groups, *viz*, (1) those on the uterus (dilatation and curettage, cervical amputation, anterior hysterotomy, interposition, hysterectomy, morcellation of fibroids), and (2) those on the outer genitals (partial or total vulvectomy, anterior colporrhaphy, perineorrhaphy, repair of complete tears). In the first group analgesia is produced by infiltration of the parametria, in the second, by infiltration of the field of operation.

The standard fluid for injection is a $\frac{1}{4}$ per cent *novocaine in a normal saline solution* with the addition of 3 drops of *adrenalin* to each ounce (30 cc) of the fluid. In every case, the patient is brought to the operating room in a fairly deep "twilight sleep" so as to allay apprehension and to render the unnatural lithotomy position on the operating table endurable. In the vast majority of instances, complete analgesia is accomplished within 5 minutes and maintained throughout the operation, very rarely, is a whiff or two of *ether* or *gas* required in lengthy operation, chiefly to relieve the discomfort of the strained posture. The amount of fluid needed ranges, according to the nature of the operation, from 2 to 4 ounces (60 to 120 cc.) Since the low percentage of the novocaine leaves the solution practically isotonic, there is no danger of toxicity even when large

amounts have been used. Neither has the infiltration in hundreds of cases and in more than 10 years ever interfered with wound healing.

There are only 2 possible *dangers* connected with this method which, however, may readily be prevented. The *needle may enter a blood-vessel*. In this case, the novocaine solution would be injected directly into the circulation, thereby causing alarming symptoms. Although this complication has proved to be of short duration in the very few instances reported in literature, it may be avoided by a tentative pull on the piston, which would show the absence of blood in the syringe. The second possible danger may come from *breakage of the needle*. Steel needles rust easily, and if a break occurs it is near the hub. The simple precaution consists in not inserting the needle its entire length.

Compared with these few negligible complications, the advantages of local anesthesia are numerous and impressive. Undisturbed by bleeding and no longer forced to work at top speed, the tissues involved can be carefully dissected and approximated. Further, all vaginal operations are more readily borne by patients than abdominal ones. This advantage is even more apparent when unfavorable cases, so-called "poor surgical risks" are being dealt with. In this category, first place must be given to aged people. The oldest patient on whom the author performed a vaginal hysterectomy under local anesthesia with perfect success was 76 years of age. The author has also operated successfully upon a number of patients with active tuberculosis, diffuse bronchitis, emphysema, cardiorenal disease, diabetes, and exophthalmic goiter. Neither hypertension nor hypotension form contraindications, as systematic

blood-pressure readings during operations have revealed no effect of local anesthesia in either direction

In the field of obstetrics, local anesthesia is more widely used in Cesarean section. The author prefers the low cervical section and, as a rule, uses local anesthesia only for incising the abdominal wall. The separation of the bladder, the incision into the lower uterine segment and extraction of the child are done under a short *ethylene* narcosis, but the repair of the uterus and closure of the abdominal incision require no general anesthesia. It is, however, freely admitted that many other operators perform this operation entirely under local anesthesia. In any case, the traditional haste in closing the uterus becomes unnecessary and the increased thoroughness of adaptation acts as a safeguard against future rupture.

Of other obstetric operations, curettage for incomplete abortion (which, however, often requires nothing more than "twilight"), and interruption of pregnancy by means of anterior hysterotomy may be mentioned. In a recent case of the last-named kind the patient suffered from a severe uncompensated heart lesion but passed easily through the operation, during which she had no loss of blood whatever.

The use of local anesthesia in normal deliveries seems to the author to be of great practical value. The patient receives a preliminary seminarcois by means of *morphine* and *scopolamine*, *amytal*, or the like, which lasts well into the second stage. When the head descends below the spines, the lower circumference of the vulva, the levators and the perineal body are well infiltrated. This is followed within a few minutes by a marked relaxation of the pelvic floor, and the head passes pain-

lessly, either spontaneously or with low forceps, through the vulva. Local anesthesia at this stage almost invariably slows down uterine contractions, and for this reason an injection of *pituutrin* is desirable. It has, of course, no ill effect on the child and none on the course of the third stage. Episiotomies can be made and, later, repaired without loss of blood or sense of pain, and the same is true of any tears that may have occurred. There is about local anesthesia in normal deliveries a sense of security and a simplicity and ease which render the procedure applicable both to hospital and home obstetrics, and in the latter case obviate the need of an anesthetist.

Complications.—The reading of a report on *gangrene of the toes* following administration of a local anesthetic induced E. Stark (Zentralbl. f. Chir. 59 1811 (July 23) 1932) to describe his method of prevention. He states that although among his patients he never observed this complication, he nevertheless feared it and, therefore, took a prophylactic measure. He considers gangrene not so much the result of the particular anesthetic, but believes that it is due to the tenseness of the tissue; he, therefore, follows the intervention by a vigorous massage of the toes or fingers until the tenseness has disappeared. This massage is painless, for as soon as it becomes painful, the object of the massage is attained.

Nupercaine as a Local Anesthetic.—E. Thomsen (Ugeskr. f. læger 93 922 (Sept. 4) 1931) has used a 1:1000 solution of nupercaine as a local anesthetic in various major and minor operations. Epinephrine was not added. He considers nupercaine an excellent local anesthetic in most cases. An instance of grave *intoxication* following the application of nupercaine, however,

points to the need of considerable care in its use

Nupercaine has been used by O A Schwarz (Deutsche med Wchnsch 56 526 (Mar 28) 1930) with much success in **genitourinary surgery**. He has found that a solution of 0.1 to 0.15 per cent introduced into the urethra produces a complete anesthesia of the urethral mucous membrane which lasts a long time, long enough to allow a catheter to be retained for 48 hours without any discomfort. For anesthetizing the bladder the same strength of solution is used with the addition of 5 to 8 drops of a 1:1000 solution of *adrenalin* to each 10 cc of *percame*. Over 250 painless cystoscopies have been performed by this means. The anesthetic takes about 5 minutes to produce its effect, but Schwarz prefers to wait about 15 minutes before introducing an instrument into the bladder. The usual method of preparation of the solution is to dissolve 1 percame tablet of 0.05 Gm ($\frac{3}{4}$ grain) in 50 cc. ($1\frac{2}{3}$ ounces) of distilled water. This solution is quite stable, retaining its efficiency for about 6 weeks and the amount suffices for 2 to 3 cystoscopies.

Acute nupercaine *intoxication* occurred in a patient observed by S. With (Ugeskr f læger 93 925 (Sept 4) 1931) after the injection of 35 mg. ($\frac{1}{2}$ grain) of nupercaine in a case of exophthalmic goiter. Intradural injection was excluded, and the result is ascribed to the intravenous injection of 10 mg. ($\frac{1}{6}$ grain) of nupercaine at the most. Care is urged in deep injections in regions where there are chances of a partial intravenous injection.

SACRAL BLOCK ANESTHESIA.—E Davis (J. A. M. A. 97. 1771 (Dec 12) 1931) concludes that sacral anesthesia is the anesthesia of choice for

perineal prostatectomy because it is uniformly and dependably accurate if it is induced by the correct technic with the needles unquestionably in the foramina. It is applicable to every case in which prostatectomy is done and is associated with no hazard if precautions are taken not to puncture the dural sac or blood-vessels. Its induction requires on an average only $12\frac{1}{2}$ minutes, and it was a factor of importance in maintaining the low mortality rate of 2.38 per cent in 378 consecutive perineal prostatectomies.

Caudal Anesthesia.—A new method for locating the sacral hiatus and the uses of caudal anesthesia in urology is described by W H Haines, N. Mumey, and E F Faber (Internat Clin. vol. ii, Series 34). In working out suitable landmarks so that more accurate location of the sacral hiatus could be made, the authors determined that the posterior superior spines of the ilium and the center of the hiatus marked the angles of an equilateral triangle. The posterior superior spines of the ilium are readily located by palpation, and by the dimpling, which nearly always shows at these two points. With a rule, the distance between the two spines is determined, then a line drawn the same distance from each spine toward the tip of the coccyx meets its fellow over the center of the hiatus. This may be more accurately done by placing the points of pencil calipers over each spine, then describing from them toward the coccyx. The intersection of the two arcs will mark the desired point. This should be verified, if possible, by palpation, which gives a double assurance of locating the opening.

The authors used caudal anesthesia in 16 cases as follows: 7 cystoscopies, 2 hydroceles, 1 scrotal hernia, 2



Fig 1 —The needle is inserted through the skin and sacrococcygeal membrane at the apex of the triangle at an angle of 10° , in order to enter the hiatus (Haines, Mumey and Faber International Clinics, Series 34 J B Lippincott Co)



Fig 2 —Needle being introduced into the sacral canal at an angle of 45° (Haines, Mumey and Faber International Clinics, Series 34 J B Lippincott Co)

orchidectomies, 1 prostatic abscess, 2 circumcisions and 1 tumor of the testicle.

Five of the total number of cases were reported as failures, mainly encountered in the beginning, which were ascribed to faulty technic, either from failure to enter the canal or from insufficient amount of novocaine.

The authors believe caudal anesthesia to be a safe procedure without contraindications. The extent of anesthesia depends on the amount of solution injected and not the strength or percentage of the anesthesia. The duration of the anesthesia is long, which makes it an especially desirable method for time-consuming examinations or operations around the bladder and perineum. Failure of the method does not contraindicate the use of other anesthetics.

TWILIGHT SLEEP.—E. Speer (Deutsche med. Wchnschr. 57:355 (Feb. 27) 1931) induces twilight sleep in order to overcome the abstinence manifestations. He employs *phenobarbital* and *scopolamine*, and in recent years he has added a solution of secondary *butylbrompropenylbarbituric acid* in order to deepen the sleep without having to fear phenobarbital intoxication. Altogether the twilight sleep never lasts more than 5 days, in milder cases only 3 days. The first injection of 0.4 Gm. (6 grains) of phenobarbital and of 0.001 Gm. ($\frac{1}{64}$ grain) of scopolamine is given in the evening. The twilight sleep does not interfere with the proper feeding of the patient. The noon meal may be served before the midday injection and the evening meal before the injection at night. After twilight sleep, the patients do not remember past pains or discomforts, but they are at first dizzy and sensitive to light. At this time the patients should be treated with especial

kindness and consideration so as to gain their confidence, upon which largely depends the success of the psychotherapy, which is the second and most important part in the treatment of morphine addicts. Medicaments should not be given, but bodily exercises are of great help after withdrawal. Care should be taken that the patients gain in weight. During the second week *sunbaths* and *swimming* are advisable or, if the season does not permit of this, the patients are given daily *quartz lamp irradiations*.

ANESTHESIA, SPINAL.—EXPERIMENTAL STUDIES.—On the basis of experimental work on dogs, J. O. Bowers, J. H. Clark, G. Wagoner and J. C. Burns (Surg. Gynec. Obst. 54:882 (June) 1932) conclude that the fall in blood-pressure following the injection of an anesthetic into the subarachnoid space is not due to a collection of blood in the splanchnic area.

L. K. Ferguson and J. P. North (*Ibid.* 54:621 (Apr.) 1932) have shown that division of the splanchnic nerves produces only a slight alteration in the general blood-pressure and the typical fall of blood-pressure in spinal anesthesia can be produced in animals with both splanchnic nerves completely severed. The entire vasomotor system participates in a vasodilatation, and the degree of blood-pressure depression is in direct ratio to the number of white rami anesthetized.

Bower and his associates state that when the anesthetic ascends to the fourth thoracic nerve roots or higher in the dog, there is an associated dilatation of the heart. The marked fall in blood-pressure is mainly cardiac. Paralysis of the intercostal and phrenic nerves interferes with normal chest expansion and diaphragmatic excursion, causing a

damming back of venous blood in the right heart and its tributaries. When the ascent of the anesthetic in the spinal canal is gradual, the blood-pressure drops gradually and reaches its minimum in from 15 to 20 minutes. When the anesthetic ascends rapidly and sufficiently high to affect not only the nerves of respiration but also the respiratory and vasomotor centers, the fall in arterial pressure is almost immediate but may be preceded by an asphyxial rise. Sudden deaths following intraspinal injections may be cardiac, cardiac and respiratory, or respiratory. Epinephrine and ephedrine did not prevent cardiac dilatation in the authors' experiments. The Drinker respirator alone will resuscitate an animal that has received the full adult dose of a spinal anesthetic into the cisterna. Up to the present time there is no known method of absolutely preventing deaths from spinal anesthesia, but artificial respiration offers the best means for combating respiratory embarrassment and the fall in arterial pressure.

Girdle-formed Spinal Anesthesia.

—In its present form, spinal anesthesia necessitates filling a large portion of the dural cavity with an anesthetic which, because of its toxicity, is not indifferent. Moreover, a wider area is anesthetized than the operation requires and the unnecessarily extensive anesthesia is associated with the danger of disturbances in the respiration, heart action, and vasomotor function. Furthermore, the previously estimated amount of the anesthetic agent must be administered at once, individualization being, therefore, impossible.

M. Kirschner (Arch f klin Chir 167 755, 1931) uses a method which is free from these disadvantages and bases his statements on more than 300 cases.

His technic produces a circumscribed girdle anesthesia which is limited caudally and cranially, is movable, and depends in extent upon the amount of the anesthetic agent used.

With the patient on his side in a Trendelenburg position of at least 20°, spinal fluid is withdrawn and replaced by an equal quantity of air. The air should occupy the highest point in the dural cavity. This depends upon the degree to which the head is lowered. To prevent the spread of the anesthetic in a cranial direction, Kirschner uses a solution which has a specific gravity less than that of the spinal fluid and floats upon the spinal fluid. A $\frac{1}{4}$ per cent solution of *percaïne* is an effective agent. By varying the size of the air bubble in the dural cavity, the anesthesia can be obtained at the desired site. Individual dosage is made possible by means of a double syringe. With 50 c c ($1\frac{2}{3}$ ounces) of air on one side, 5 c c ($1\frac{1}{4}$ dram) of solution on the other, and a common outlet, the syringe permits the introduction of air or anesthetic according to the requirements of the individual case. The needle must be left in place until anesthesia is induced, which usually requires about 5 minutes; then, depending upon the level of the anesthetic girdle and the depth of the anesthesia, more air or solution is injected.

It has been found that 2 c c (32 minims) of the solution will induce anesthesia of an operative field of average extent. By injecting 5 c c ($1\frac{1}{4}$ drams) of air into the dural cavity (with the head down) analgesia of the lower extremities is obtained. When from 15 to 30 c c ($\frac{1}{2}$ to 1 ounce) of air are injected, the anesthesia reaches the nipples, whereas the legs, the nerves of which run through the air in the

dural space, are not anesthetized. Inclination of the body with the pelvis upward must be maintained throughout the operation. Maximal anesthesia is attained in from 5 to 10 minutes and lasts for from 1 to 3 hours. The after-effects are milder than those of methods used previously. Immediately before the spinal puncture 0.05 Gm ($\frac{5}{100}$ gram) of *ephedrin* is given. Because of the locally circumscribed action of the anesthetic agent, the fall in the blood-pressure, which constitutes the chief danger of spinal anesthesia, is slight or absent.

PHYSIOLOGICAL ACTION.—

Circulatory Changes.—Circulatory changes during spinal anesthesia are discussed by M. H. Severs and R. M. Waters (*Anesth and Analg* 11:85 (Mar-Apr) 1932). The authors state that the study of the factors involved in the circulatory depression occurring in spinal anesthesia has been retarded by the general belief that the cause is visceral vasodilatation resulting from splanchnic nerve paralysis. One of the chief causes of this depression is cellular oxygen want. Several factors produce a vicious cycle, lowering of the blood-pressure resulting in a decrease in central vasoconstrictor tone, and the latter resulting in further lowering of the blood-pressure.

Physiologists have long recognized the importance of skeletal tone and contractility in the movement of capillary and venous blood. One of the factors in the circulatory depression of spinal anesthesia is functional severance of the motor nerves to over half of the skeletal muscles.

A secondary factor in the vascular muscle tone is the acid-base balance of the blood. An increase in the hydrogen-ion concentration of the blood lowers the vascular muscle tone. Studies of

the blood and alveolar oxygen in patients and of the arterial blood in dogs under spinal anesthesia showed the oxygen tension in the tissues to be relatively low during the period of circulatory depression. Samples of venous blood after spinal anesthesia with circulatory depression showed a lowered oxygen content and capacity with a raised carbon dioxide content, a decrease in the carbon dioxide capacity, and a decrease in the hydrogen-ion concentration. Samples of alveolar air showed an oxygen shortage and carbon dioxide increase of about the same grade as that following the use of other respiratory depressants such as the barbiturates.

Another factor in the circulatory depression of spinal anesthesia is intercostal nerve paralysis. In experiments on dogs, section of the intercostal nerves resulted in a gradual fall in the blood-pressure in 24 minutes from 116 to 54 mm. Hg. The gradual nature of the drop suggested that the decrease was due to oxygen want.

In animals in which the intercostal nerves were sectioned, the authors were able to maintain or restore the normal blood-pressure by maintaining normal chest activity with the use of an artificial respirator of the Drinker type. Following high cervical block, normal pressures were maintained for relatively long periods of time.

The theory that the circulatory depression of spinal anesthesia is due primarily to oxygen want is supported clinically by the fact that patients who were instructed to breathe deeply or who were given oxygen-rich mixtures maintained a better blood-pressure, felt better, and were less nauseated than others. The authors, therefore, suggest the administration of *oxygen-rich mix-*

tures to patients under spinal anesthesia to prevent or overcome circulatory collapse

Ephedrine given previous to the induction of spinal anesthesia tends to maintain normal blood-pressure, but after the blood-pressure has dropped, it is less prompt and less effective in its action, and when the blood-pressure is low, it may not only fail to restore the pressure to normal, but may prove toxic to the myocardium

The authors conclude that the treatment of *accidents* following spinal anesthesia should consist of two-phase artificial respiration plus the intravenous administration of *ephedrine* in a dosage sufficient to maintain the blood-pressure at the pre-anesthesia level. They have found that in animals the circulatory depression occurring in spinal anesthesia is much more marked when barbitol, ethylene or nitrous oxide is given or morphine or scopolamine is administered as a preoperative sedative than when spinal anesthesia is induced without supplementary measures

UNTOWARD EFFECTS AND COMPLICATIONS.—The causes of *paralyses of cranial and spinal motor nerves* occurring some time after operations performed under spinal anesthesia and apparently not directly attributable to the anesthetic are discussed by C Angelescu and S Tzovaru (*Presse méd* 39 1855 (Dec 16) 1931). The theory that they are due to the toxicity of the anesthetic is refuted by the observation that they are no more frequent following the use of *stovaine* than following the use of less toxic anesthetics

According to the authors' theory, these paralyses are due to a generally attenuated and transient infection, already present at the time of the opera-

tion, which involves the neuraxes following rupture of the meningeal barrier by the spinal puncture. This theory is supported by the fact that they occur most frequently in patients who are operated upon for inflammatory lesions, they are most common in cold weather when low-grade respiratory infections are prevalent, and they develop after a latent period comparable to a period of incubation. The infection is conditioned by many factors, such as the character of the infecting organism, a special predisposition of the patient to the localization of infection in the neuraxes, and the condition of the meninges and nerve centers at the time of the puncture. These factors explain better than any others the rarity of the complication following spinal anesthesia

The authors believe that their theory is supported also by the fact that similar paralyses are known to occur following simple spinal puncture, the injection of distilled water, and reinjection of the patient's own spinal fluid, and by the experimental work of Weed, Ayer, and others, which showed that spinal puncture after the intravenous injection of microorganisms caused a fatal septic meningitis

Lumbosacral radicular paralysis occurring in a woman operated upon for chronic appendicitis has been reported by O Copello, V Dimitri and J Naim (*Semana méd* 1 589 (Feb 25) 1932). Physical examination revealed the usual signs of pain on pressure in the right iliac fossa. The operation was performed under spinal anesthesia induced with *novocaine*. At the time of the spinal puncture the patient noticed that her left leg moved automatically, there was a continuous extension and flexion which she was unable to prevent. She had no pain. During the operation

nothing abnormal occurred. After the operation, however, the patient experienced severe pain in the right leg when she was lifted and the left leg remained anesthetic. When she tried to stand, she found it impossible to move the left leg, and it was insensible to touch, heat, and pain and also to treatment of a severe burn which had been caused by a hot-water bag. Later, the patient complained of pain in the lumbar region, which was localized at the site of the puncture and radiated to the inguinal and gluteal regions of the left side. There was no dysuria. Even light pressure on the lumbosacral region on the left side caused intense discomfort. There appeared to be a definite hyperesthesia of this entire region. A diagnosis of paralysis following spinal anesthesia was made.

Six months after the operation the condition remained practically the same. The only improvement was a slight increase of muscular power in the paralyzed extremity.

The authors believe that there was an injury to the cauda equina, and that this may have been due to a hematoma which was responsible also for the persistence of the paralysis.

K. R. Fawcett (Minnesota Med 14: 648 (July) 1931) reports 2 cases of *external rectus paralysis* following spinal anesthesia with novocaine. In the first patient the paralysis developed postoperatively on the thirteenth day and cleared up completely in 13 days. In the second patient the paralysis developed on the twelfth day after operation and was still present at the end of 17 months. This complication of the spinal anesthesia is relatively rare; Reber reports 5 cases in a series of 2000 anesthetics. The external rectus is the muscle most frequently involved.

In 88 cases reviewed by Blatt the fourth nerve was involved in 4, the third in 6, and the sixth in 78. The interval between the anesthesia and the onset of the paralysis varies between 3 days and 3 weeks. The *prognosis* is favorable. In most cases the paralysis disappears in from 1 to 3 weeks. In a few it persists longer. The onset is usually accompanied by photophobia, headaches and dizziness. The etiology of the paralysis is still a matter of conjecture. It seems most probable that they are caused by an elective toxic action of the injected drug. However, they may have their basis in a mild localized hemorrhage. Van Lier has demonstrated swelling of the nuclei of the ganglion cells after spinal anesthesia. It is known that the injected drug often diffuses up around the medulla and base of the brain in appreciable concentration. It is possible, therefore, that the ocular muscle paralysis is due to degeneration of the ganglion cells.

Nupercaine.—According to B. B. Dikshit and D. H. Rao (Indian M. Gaz. 67:69 (Feb.) 1932), nupercaine is a drug of fairly high toxicity which is increased in toxic conditions. It has a powerful action on the cardiovascular system and produces a slowing and irregularity of the heart in small doses. Blood-pressure is lowered and the splanchnic vessels are dilated. It markedly depresses the respiratory center and this action is manifested when the drug is injected intravenously or applied locally by injecting it into the cisterna magna. On the central nervous system it acts as a convulsant. Its action on the sensory nerves is marked, analgesia being produced in low concentrations. Clinically it has been found to be a drug of high potency and toxicity, and great care is necessary in its ad-

ministration Proper technic is necessary for success Blood-pressure is better controlled by giving *ephedrine* 10 minutes after the spinal injection Respiratory embarrassment is more to be dreaded than circulatory disturbances but is much less frequently encountered Headache is the only important undesirable sequela and it is amenable to treatment The duration of analgesia and the degree of muscular relaxation are the distinctive features of the drug when given by the spinal method

INDICATIONS.—*Abdominal Surgery.*—Spinal anesthesia was used by L S McKittrick, W L McClure and R H Sweet (Surg Gynec Obst 52 898 (Apr) 1931) in a series of 415 cases in whom the age-incidence was between 10 and 80 years Most of the operative procedures were within the abdomen *Ephedrine sulphate*, 50 mg ($\frac{5}{8}$ grain), was given to each patient prior to the injection of the anesthetic

Spinocaine was used first in a few cases, but was discontinued because of its uncertainty, due to delays in anesthesia and in 1 or 2 instances a complete absence In the majority of the cases 100 to 200 mg ($1\frac{1}{2}$ to 3 grains) of *procaine hydrochloride* crystals were used The duration of anesthesia was variable, it usually lasted from 1 to $1\frac{1}{4}$ hours in the upper part of the abdomen Some form of supplementary anesthesia was required during the first hour in $2\frac{3}{5}$ per cent of the series, while $10\frac{4}{5}$ per cent required a general anesthetic for the completion of the operation As opposed to this, 66 per cent of 85 operations which lasted $1\frac{1}{2}$ hours or more required no additional anesthesia

Of this series, $10\frac{4}{5}$ per cent had a fall in blood-pressure of 50 per cent or more during the operation This apparently bore no relation to the amount

of procaine used, nor to the height of the anesthesia, nor to the preoperative level of blood-pressure Hypertension (a systolic blood-pressure of 150 or over) was present in 12 per cent of the series In this group, it was noted that 47 per cent of the patients had not regained the preoperative level of blood-pressure within 20 hours after operation There were 33 patients in the series with hypotension (a preoperative systolic blood-pressure of 100 or less, not due to shock) In 11 cases, the blood-pressure rose after the injection of anesthesia, and in only 5 cases was there a fall of 50 per cent or more The time necessary for recovery of blood-pressure in this group is in contrast to the hypertension group, as of the 18 cases followed all had regained or exceeded the preoperative level of blood-pressure within 30 minutes after operation

Postoperative *sequelæ* due to the spinal puncture were absent There were 6 cases of headache, only 1 of which was severe Complications of the respiratory system accounted for 40 per cent of those occurring—a higher percentage than that in a similar series with general anesthesia, and also higher than that which occurred in the same service the previous year under general anesthesia There were 13 cases of pneumonia, with 6 deaths. Two of these had upper respiratory tract infections previous to operation, and 2 had ether to supplement Among the 338 cases whose record was carefully followed there were 40 *deaths* The majority did not bear any relation to the type of anesthesia, but in a few the anesthetic falls under suspicion Five patients died suddenly within 48 hours of operation Four of these died in a similar way, apparently of acute pul-

monary edema. The fifth case died of shock. In none of these cases was the rôle of the anesthetic very clear, but nevertheless, the deaths occurred suddenly and unexpectedly. One death, which occurred during operation, appeared directly due to spinal anesthesia. It was most satisfactorily explained by a paralysis of the accessory muscles of respiration.

In conclusion, the authors raise the question as to whether, in the light of these results, the use of spinal anesthesia, with the expectation of preventing pulmonary complications, would be justified. They point out that in this series there is no evidence to show that the number of these complications is decreased by this type of anesthesia.

L. F. Sise (Anes and Analg 11:23 (Jan-Feb) 1932), after reviewing the work of McKittrick and his associates (*loc cit*) and other available data, concludes that the type of anesthesia is of little importance in the production of postoperative pulmonary complications although such complications are probably slightly more frequent after ether, especially in cases of operations on the upper part of the abdomen.

Of chief importance in the development of such complications seems to be the type of operation, but acute and even chronic respiratory infections are important contributory factors.

Inhalations of *carbon dioxide* tend to lessen the incidence of atelectasis even if not that of other pulmonary complications.

The results in a consecutive series of 100 spinal anesthetics are reviewed by R. Bonneau (Bull et mém Soc d chir. de Paris 23:514 (July 3) 1931). The author injected an 8 per cent solution of *syncaïne* by the lumbar route in such a way as to obtain anesthesia mounting

to the mammillary line, thus involving the entire subdiaphragmatic region of the body instead of only the subumbilical region.

The cases included a considerable number of very poor risks, as it is especially for such cases that Bonneau uses spinal anesthesia. This procedure was used in the following operations on the stomach, duodenum, biliary tract, kidneys, bladder and prostate, operations for hernia, peritonitis, appendicitis, obstruction and tumors of the intestines, and gynecological conditions, and operations on the extremities.

One death occurred on the operating table. Just as the author was in the act of removing a cancer of the colon, the patient was seized with an attack of fecaloid vomiting and fatal asphyxia resulted from aspiration of the vomitus. This fatality led the author to order *gastric lavage* before local and spinal anesthesia, as well as before general anesthesia in all cases of obstruction or peritonitis which are complicated by severe vomiting.

Ten deaths occurred within the first 15 days after the operation. In the author's opinion, however, not one of these was due to the anesthesia. Death from bulbar inhibition, manifested by hypotension, disappearance of the radial pulse, apnea, and loss of consciousness, was prevented by a careful technique and extremely slow injection. This type of reaction occurs either during or within 3 or 4 hours after the administration of the anesthetic.

Death from septic meningitis due to faulty asepsis was prevented by the most rigid personal superintendence of the procedure. Chemical meningitis has become rare with the perfection of laboratory products.

The special sensibility of the subarachnoid space to certain substances injected must always be kept in mind. In none of the cases reviewed, nor in fact in any of the author's cases of spinal anesthesia, has paralysis of the lower extremities or the external oculomotors occurred or has headache developed.

Urinary retention seemed no more common after this form of anesthesia than after other forms, and during one week in which the author performed several operations under both general and spinal anesthesia, *dysuroi* was required after the former instead of the latter.

The varying results obtained by various surgeons are due to differences in technic, dosage, products used, concentration of the solution, site of the injection, and position of the patient. In all of the author's cases the same technic was employed.

The advantages of spinal anesthesia are summarized as follows:

1. It permits operations to be performed without shock on obese, feeble, and cachectic patients, those with cardiopulmonary conditions, and those with severe infection.

2. It suppresses reflex muscular contraction.

3. It stimulates peristalsis of the intestine to a marked degree, causing immediate evacuation of distended or paralyzed loops.

4. It conserves the defensive reflexes. Soon after the operation the patient is able to drink water and to take food. He can breathe deeply, cough, expectorate, and move his arms and legs.

5. In prostatectomy, enucleation is facilitated by inhibition of the anal sphincter, and the contractility of the muscular fibers of the prostatic sac is

increased rather than abolished. After enucleation, retraction occurs promptly.

For operations on the perineum, J. K. Hasler (Lancet 1 80 (Jan 9) 1932) states that low spinal anesthesia is highly satisfactory. The anesthetic is easy to administer, rapid in action, and provides good anesthesia limited to the area of operation. There is no drop in blood-pressure and the condition of the patient remains good throughout. The author believes that these advantages should be applicable to 100 per cent of cases.

In any case of *thromboangitis obliterans* E. D. Telford and J. S. B. Stopford (Brit M J 1 1116 (June 18) 1932) state that there is an element of vasospasm, which can be relieved by cord sympathectomy, and also an element of thrombosis, on which operation is useless. The propriety of operating can be decided only by an endeavor to estimate the relative amounts of spasm and thrombosis. The authors feel that this can best be done in the lower limbs by a spinal anesthetic.

The method need involve no trouble for the patient, as the spinal injection is given on the operating table and the operation can be undertaken or abandoned on the observations given by the thermometer within 5 minutes of the injection. These advantages render this method much more attractive, safer, and quicker than those involving the intravenous injection of substances which commonly cause the patient discomfort for some time. Furthermore, the response to a spinal anesthetic gives an accurate record of what can be expected from sympathectomy, while the rise in surface temperature induced by fever only approximates roughly to that following excision of the sympathetic supply.

PERIDURAL ANESTHESIA.—

Technic.—A new method of *lumbar anesthesia*, the so-called peridural anesthesia, according to Dogliotti's technic (injection of anesthetic into the epidural space, without perforation of the dura mater) is described by M. Sagarra (Arch de med cir y especialid Madrid 35 161 (Feb 27) 1932)

The patient is prepared in the same manner as if he were being given spinal anesthesia. The level at which the injection is to be made is determined according to the region in which the operation is to be performed. A short needle, mounted on a mandrin, is introduced slowly until it passes beyond the resistance offered by the yellow ligaments of the vertebral laminae. The mandrin is then detached from the needle while the latter is left in place. If cerebrospinal fluid does not ooze through the needle, it is an indication that the needle's point is in the epidural space, where the injection should be made. Without moving the needle, a syringe of 10-c.c. capacity, filled with physiologic solution of sodium chloride is connected and its contents slowly injected. The epidural space offers no resistance to the injection. In case of resistance, a slight withdrawal of the needle places it in the proper location. A syringe of 50-c.c. capacity (of the Luer type), filled with a 1 per cent solution of procaine hydrochloride, is then connected. As the important point before giving the injection is to be sure that the needle did not perforate the dura and that the injection is made in the epidural space, only 10 c.c. ($2\frac{1}{2}$ drams) of the anesthetic is given first. The absence of symptoms, which commonly appear in 5 minutes in spinal anesthesia, gives proof of the proper position of the needle in the peridural space, and the injection may be slowly continued until the patient receives from 25 to 50 c.c. ($6\frac{1}{4}$ to $12\frac{1}{2}$ drams) of the anesthetic. The needle and the syringe are then withdrawn together. Twenty minutes should elapse between the injection and the beginning of the operation to obtain complete anesthesia. During this time the patient is instructed to keep in the proper position so as to obtain the larger displacement of the anesthetic toward the nerve roots that supply the given operative area.

Peridural anesthesia is safer and gives better results than spinal and paravertebral anesthesia because of the absence of shock and of postanesthetic complications (intense headache, due to the loss of cerebrospinal fluid through the opening of the puncture, and sometimes relaxation of the sphincters or retention of the urine), the simplicity of the technic by making only 1 puncture, and its longer duration (more than 3 hours). Extremely nervous patients may present during the operation either slight nervous disturbances or a diminished arterial pressure and peripheral vasoconstriction with marked paleness. The inhalation of a few drops of *ether* or *chloroform* by the patient will permit the operation being completed without any more nervous disturbances, while the injection of 1 c.c. (16 minims) of *caffeine* improves the arterial or vascular pressure. The method gives satisfactory results in 85 per cent of the cases. Its principal indication is for lumbar and upper abdominal operations.

CONTROLLED SPINAL ANESTHESIA.—In a communication before the Philadelphia Neurological Society, November 25, 1932, Temple Fay and Nicholas Gitten considered a new method of controlled spinal anesthesia and its value in establishing appropriate levels for chordotomy. In order to study certain clinical problems presenting intractable pain, these authors devised a simplified method for producing spinal anesthesia and controlling the anesthetic in such a way that the spinal segments and roots anesthetized could be determined in an orderly and progressive manner.

The value of the test lies in establishing the highest level at which pain fibers enter the spinal cord from a given part. They observed that deep vascular and pressure pain was not objectively or subjectively removed until the spinal roots had been anesthetized at higher levels than the peripheral nerve pattern would indicate. In order to obtain complete

anesthesia in the lower extremities, it was necessary to raise the level of anesthesia to the third thoracic segment. They observed that vascular types of pain persisting in an area of anesthesia on the face after obliteration of the trigeminal root, were relieved by spinal anesthesia carried to the fifth cervical segment. The authors indicate the test to be of value in determining the appropriate level for chordotomy (Spiller operation), so that section of the anterolateral column can be accomplished sufficiently high in the spinal cord to include all pain fibers from the part involved. They believe a distinct system of pain fibers may be carried along the large vascular structures to find entry into the upper thoracic cord, and that chordotomy must be accomplished above the third thoracic segment in order to obtain total analgesia in the lower extremities and as high as the fifth cervical segment where involvement of this type of pain occurs in structures of the upper portions of the body including the face.

An illustration of the method was given in a glass apparatus specially constructed to simulate a spinal fluid response.

Technic—The patient is placed on a tilted table, with head down and body at an angle of at least 30°, a spinal needle introduced into the fourth or fifth lumbar interspace and a similar needle introduced into the cisterna magna. The cisternal needle is connected by sterile rubber tube to a graduated burette containing 50 cc (1½ ounces) of sterile physiological saline solution. As the burette is raised above the level of the lumbar needle, fluid flows from it into the cisterna magna, forcing spinal fluid out of the lumbar needle. The burette is then lowered to a point just below the lumbar needle, permitting the fluid to flow back into the burette and allowing air to be drawn into the lumbar needle. As the column of spinal fluid descends, 1 cc (16

minims) of an ascending type of spinal anesthesia is then introduced into the lumbar needle, and this is gradually drawn down the spinal canal, segment by segment, by lowering the burette, so that the column of fluid in the burette comes to an equilibrium with the column of spinal fluid at the desired level indicated by the accepted physical landmarks on the back of the patient.

Objective and subjective tests may be carried out during the time that the anesthetic is permitted to be arrested at the level under consideration. The spinal anesthesia may be drawn down to the fifth cervical segment and checked at this point so as not to permit paralysis of the motor supply to the diaphragm, which may impair respiration and is undesirable. On the other hand, the anesthesia may be carried higher if the operator so desires. When the required observations have been completed, the burette is then elevated so as to refill the spinal canal and wash out the anesthetic through the lumbar needle. The high effects of the anesthesia begin to disappear within 4 or 5 minutes, and sensation and movement return to the lower extremities in approximately 20 minutes. No ill effects from the procedure have been noted when carefully carried out.

The findings confirm the observations of Foerster, and indicate that chordotomy (section of the anterolateral columns of the spinal cord), when successfully accomplished above the level required for complete analgesia, as shown by this test, is capable of permanently abolishing pain and temperature from the involved portion of the body.

The operations devised for relief of pain by means of rhizotomy, ganglionectomy and periarterial sympathectomy may find more appropriate solution in the single operation of chordotomy when the appropriate level for this procedure has been established.

The value of the method for studying segmental pain, as well as its possible use in differential diagnosis as to the origin and existence of vague types of pain, is indicated. The possible value

of the method, from a purely surgical standpoint, lies in the fact that a definite control of the level of anesthesia may be maintained by the operator at all times, and the residual effects due to otherwise uncontrolled diffusion are removed through the process of washing out the spinal anesthesia after its desired effects have been obtained

ANESTHETICS IN THERAPY.

—J S Lundy (J A M A 99 968 (Sept 17) 1932) states that medical cases sometimes offer a field in which an anesthetist may contribute to correct diagnosis or better care of the patient. For example, in **tetanus**, the intravenous use of the *barbiturates*, alternating with *morphine* and *magnesium sulphate*, has given relief to patients whose symptoms would otherwise have been resistant to control. The contribution has been not to the cure of the disease so much as to the control of symptoms. In **asthma**, the use of *oil-ether* by *colon* has at times apparently been a life-saving measure, when the asthmatic condition has become otherwise uncontrollable. In almost any condition in which **convulsions** are difficult to control, the *barbiturates* have been found to be useful, for example, in **strychnine poisoning**, **eclamptic convulsions of pregnancy** and **meningitis**. In certain cases in which pain is most difficult to control, the enduring effects of the *barbiturates* in large doses have controlled otherwise intolerable pain. Examples are industrial accidents, fatal burns or crushing injuries. The control of pain in war is being studied, and the barbiturates offer a method toward that end. Whereas previously the anesthetist limited himself to the administration of general anesthetics, he must now be familiar with local anes-

thetics, hypnotics and analgesics, and be prepared to supervise treatment by oxygen and other vapors, intravenous treatment or any other method by which he may be of assistance to his associates. In cases in which the differential diagnosis is essentially related to the determination of paths of transmission of pain, the diagnosis may be aided by the *blocking of nerve trunks* to certain regions. In certain nonoperative conditions the anesthetist seems to be the one most fitted to make *injections of alcohol* for its prolonged effect in control of pain.

ANIMAL EXTRACTS.—CORPUS LUTEUM.—

Therapeutics—The physiologic function of the corpus luteum, according to C. Kaufmann and L. Bickel (Zentralbl. f. Gynak., 56:1329 (May 28) 1932), consists in the protection of the implanted ovum. The fact that the corpus luteum hormone inhibits hemorrhage seems to justify its use in the therapy of gynecologic hemorrhages. The authors employed it in 16 cases of severe **uterine hemorrhages**. In the majority of these cases, other therapeutic methods had been used without avail. In 12 of the patients the hemostatic effect became apparent 7 to 8 hours after the first injection, but hemorrhage generally recurred from 12 to 16 hours later and did not disappear again until several additional injections had been given. However, more important is the regulating influence of the hormone on the menstruation. In 3 of 7 patients the cycle became almost normal, whereas in 3 the intervals as well as the duration remained irregular. In the other patient it was regular with only 1 menstruation of prolonged duration. Three women who were in the

premenopausal age, and who had hyperplasia of the uterine mucous membrane, were observed for several months following the corpus luteum therapy. In these cases, clinical cure was effected. The treatment proved likewise helpful in a girl, aged 17, who for a year had almost continuous hemorrhages. In this case other therapeutic measures had been employed without avail, but after corpus luteum treatment the cycles became regular.

ESTRIN.—G van S Smith and O W Smith (A J Physiol 100 553 (May) 1932) administered estrin orally to women whose urine was examined for the excretion of estrin over a period of 1 to 2 months. Eight cases were reported, including 4 amenorrheic patients, 3 sterile women, and 1 normal control. The results seem to indicate that in women, as in rabbits, estrin is excreted only when the organism has been exposed to the action of corpus luteum. It appears possible by this means to differentiate between a persistent corpus luteum, irregular appearance or total absence of corpus luteum, and cyclic activity of the corpus luteum.

PITUITARY GLAND—*Preparations*—The instability and the excessive cost of the few available products of anterior pituitary sex hormone prompted C Mazer and L Goldstein (Clinical Endocrinology of the Female, W B Saunders Co, Phila, Pa, 1932) to follow the suggestion first made by Zamkoff, in 1929, to employ injections of urine of pregnant women for its anterior pituitary hormone content in the treatment of menstrual disorders having an endocrinologic basis. The aforementioned writers who employ the urine of pregnancy in its natural state without concentration, were the first to report the results of this therapy in this

country. They have employed this method in a large number of women and have never noticed any ill effects from repeated injections. The urine of women in the first 3 months of gestation should be employed. The estrin content of the urine may be removed by ether. The fresh urine intended for hormonal treatment is sterilized by means of a simple Berkefeld filter, as boiling destroys the anterior pituitary sex hormone. The sterile urine is then poured into sterile test-tubes, corked and sealed with paraffin, or into sterile vaccine vials which are stored in the refrigerator for future use. The product may be kept a week before it is used.

In early pregnancy, 1 cc of urine contains approximately 4 to 5 rat or mouse units of anterior pituitary sex hormone. The amount of urine to be injected in a given case depends upon the approximate hormone content of each cubic centimeter as loosely estimated by the stage of gestation of the donor. Twenty cc (5 drams) every other day are used in cases of functional uterine bleeding, smaller quantities such as 3 or 5 cc (48 or 80 minims) are administered in cases of amenorrhea and oligomenorrhea.

Administration.—J Hofbauer (Zentralbl f Gynak, 56 1032 (Apr 23) 1932) directs attention to the dangers involved in medication with preparations of the anterior lobe of the hypophysis. In guinea-pigs, in which both ovaries had been removed and which then were treated by intraperitoneal injection of hypophyseal extracts or by transplantation of parts of the hypophysis, he noted a considerable enlargement of the vital organs, especially of the heart and kidneys, which had grown to about twice their normal size.

The enlargement of the liver and of the spleen was less noticeable. He suggests that if a prolonged medication with the hormone of the anterior hypophysis is necessary, caution should be used in administering hypophyseal preparations containing the growth hormone, especially in cases presenting deficient ovarian action. The pituitary preparation obtained from the urine during pregnancy apparently does not contain the growth hormone and would, therefore, be less dangerous to the heart and kidneys. On the other hand, it is also understandable that the preparation not containing the growth hormone will be useless to influence genital hypoplasia.

APPENDICITIS.—STATISTICS.—J. Berry (Lancet 1 1027 (May 14) 1932) does not find any evidence for the statements that appendicitis is more common than formerly and that the type of infection has become more virulent, and he does not believe that they are true. That the disease is recognized and diagnosed more frequently, and that active treatment is adopted far more often, there can, of course, be no shadow of doubt. That deaths are more common now than formerly is apparently an undoubted fact. The author believes that a little more sanity should be introduced into the present-day treatment of acute appendicitis, a little more discrimination and judgment in the choice of operation and when and how it should be performed when it is really necessary, a little less reliance on the hard-and-fast rule, adopted by so many, of operating at any and all stages—a rule so easy to follow but often so disastrous to the patient. Berry has spent half a century in watching and studying appendicitis in all its various moods and forms, and has seen

nearly every form of treatment from the simplest to the most heroic.

In a review of 401 consecutive cases of appendicitis, J. McKenty (Canad. M. J. 26 50 (Jan.) 1932) found that the results were good in uncomplicated cases and cases with localized abscess or localized peritonitis, but unsatisfactory in those of diffuse peritonitis.

Reports on 17,916 cases published by American and British surgeons since 1920 show that the average mortality was 6 per cent. Sixty per cent of the deaths were due to diffuse peritonitis.

Immediate operation in cases of appendicitis with diffuse peritonitis has a mortality of 31.9 per cent.

There is still a lack of statistics to justify conclusions as to the advisability of immediate operation or treatment by the Ochsner method in cases of diffuse peritonitis, the condition constituting the most important problem in appendicitis.

Attention is called by C. E. Black (West. J. Surg. 40:176, 1932) to the increase in the death rate from appendicitis as shown by mortality statistics in contrast to the low *mortality rate* as shown by statistics published by the large surgical clinics. He estimates that 75 per cent of the patients are operated upon in hospitals of 100 beds or less and finds no published data from institutions of this size. He urges that statistics be compiled according to standard rules, as most of the published statistics are presented in such a form that one series cannot be compared with another. He urges also the recording of statistics pertaining to preoperative and postoperative procedures.

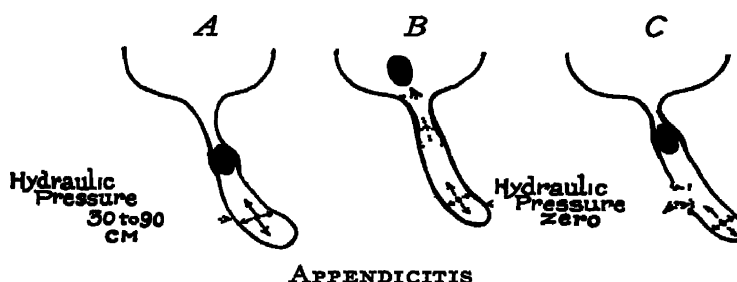
BACTERIOLOGY AND PATHOLOGY.—N. Sette and I. Barcaroli (Policlinico (sez. chir.) 39:167 (Mar.) 1932) made a bacteriological and patho-

logico-anatomical study of 100 excised appendices. From their findings and from clinical observations in 456 cases they conclude that acute appendicitis is usually an acute inflammation superimposed upon a chronic lesion. Mild inflammatory processes in the appendix are not to be interpreted as beginning chronically and becoming acute, but rather as the result of retarded or incomplete healing of a more or less severe acute appendicitis.

The bacteriological flora in the appendices studied was similar to that commonly found in the intestinal tract. In 22 cases, however, the bacteriological examination was negative. The authors

nervous system of the appendix. They doubt the specificity of determined organisms in the etiology of acute appendicitis.

ETIOLOGY.—According to B Steinberg (Ann Surg 96 451 (Sept) 1931), there are 2 diametrically opposed views in regard to the origin of appendicitis: (1) a circulatory disturbance of the appendiceal blood-vessels produces a necrosis or inflammation, supported by Ricker, Rosenow and others, (2) the enterogenic theory, which assumes that the disease arises from within the lumen of the appendix, supported by Aschoff and others. The author, after exhaustive studies and re-



A, Obstruction is followed by distention, congestion, anoxemia, prompt infection, **B**, when rising hydraulic pressure drives obstruction into colon after 1 to 10 hours, infection will be mild, "catarrhal", **C**, when obstruction holds circulation is arrested. Necrosis, gangrene, perforation, peritonitis follow (C Van Zwalenburg Am J Surg 16 427 (June) 1932)

do not attribute any pathological importance to animal parasites in the lumen of the appendix.

Many of the cases of acute appendicitis studied occurred in almost an epidemic form during an influenza epidemic. The authors have noted also that many patients with pharyngotonsillar infections complained of abdominal distress resembling that of acute appendicitis. These observations and the frequent finding of hyperplasia of the appendix have led them to support the hematogenous theory of the pathogenesis of acute appendicitis. They admit also the possibility of the elimination of virus or microorganisms, especially neurotrophic organisms, by way of the

search, explains the production of appendicitis and appendicosis. Sharp particles of fecal material are propelled by the explosive peristalsis of the appendix into mucosal bags and injure the mucosa. In the presence of an environment within the appendix favorable for growth of bacteria, *appendicitis* results, in the absence of such an environment, the bacteria are rendered nonpathogenic and *appendicosis* is the outcome.

C Van Zwalenburg (Am J Surg 16 427 (June) 1932), after demonstrating the hydraulic vicious circle as it develops in acute appendicitis, concludes that the proximate cause of acute appendicitis is a narrowing of the lumen of the appendix. The immediate cause

is a fecal mass or concretion lodging behind the constriction, causing a closed cavity, containing foul, putrefying, infective mass, which develops a hydraulic vicious circle

Further steps and factors are (a) the cavity fills with fluid to a pressure upward of 30 to 50 to 70 cm water; (b) this hydraulic pressure closes the blood-vessels in the mucosa and walls, (c) circulatory stasis results, (d) congestion, (e) effusion, edema, (f) strangulation, (g) anoxemia, and (h) anerobic mastery and infection, since appendicular bacterial flora is predominantly anerobic

FINAL MAJORITY—The rising pressure plus muscular action drives the plug with the foul mass into the colon, leaving perfect drainage, a restored circulation, and prompt recovery from a superficial (catarrhal) appendicitis

MINORITY—The obstruction holds against all pressure; necrosis, gangrene, rupture, peritonitis, etc., follow. All grades and types are possible from these beginnings.

CHRONIC APPENDICITIS—Chronic appendicitis has, as a rule, quite a different pathology. Occasionally inflammation, beginning with an acute attack, will continue to grumble and leave some of the changes commonly noted by pathologists as evidence of chronic appendicitis. However, most of the pathological changes classed as chronic appendicitis are the result of the natural degenerative changes which are constantly active in a vestigial organ

The appendix in the human is the evolving remnant of a very useful organ in many animals, especially herbivorous. Much infiltration of leukocytes naturally accompanies this degenerative change.

Van Zwalenburg fears that the report

of chronic appendicitis is predicated upon the desire to support the surgeon in his original recommendation of appendectomy

DIAGNOSIS.—In order to diagnose appendicitis, A. E. Lee (M. J. Australia 2.635 (Nov 21) 1931) states that it is necessary to understand the mechanism of abdominal symptoms

Inflammation of the gut wall does not of itself evoke direct localizing signs. Because of the embryological development, rotation mechanism, and size of the midgut, the primary intrinsic pain produced by distention anywhere along the course of this part of the intestine is felt only over the site of the mesenteric attachment, *i.e.*, in the midline in the epigastrium, above and around the umbilicus

Referred pain is produced when a stimulus overflows into other nerves entering the same segment and sensitizes these nerves so that they exaggerate responses along their course and cause painful hyperesthesia even when light touch is the only stimulus. The sympathetic system carrying sensory stimuli from the intestines sends connecting fibers to the spinal cord in the thoracic and lumbar segments.

The *reverse peristalsis syndrome* is produced by irritation or inflammation in the lower portions of the gut which render these portions more irritable than the portions cephalad to them. Under such conditions there is a reversal of the law that the stimulus to contract travels from a more irritable to a less irritable portion of the gut and that irritability decreases gradually from the cephalad to the caudal end. Reverse peristalsis is manifested by nausea, vomiting and constipation.

Parietal pain is produced by spread of the inflammation from the viscus to the

subperitoneal fascia in the area of the involved organ

The author recognizes a medical and a surgical appendicitis. *Medical appendicitis* is a simple infection of the mucosa of the appendix due to an infection of the cecal mucosa, a lymph-borne infection involving the periappendiceal glands or a simple blood-borne infection with uncomplicated inflammation. It is associated with slight nausea, vomiting, and pain in the right lower quadrant of the abdomen and may become surgical.

Surgical appendicitis is an acute appendicular obstruction caused directly by the swelling incident to acute inflammation or indirectly by scar tissue narrowing the lumen and causing early occlusion, periappendiceal spread of the inflammation causing the formation of adhesions with kinking, or diffuse fibrosis of the appendiceal wall replacing the muscle tissue, interfering with the emptying power of the appendix, and favoring stagnation. A fecalith predisposes to local inflammation with rapid block. The danger lies in the resulting necrosis of the appendiceal wall with final rupture.

In the presence of the usual signs of acute appendicitis, including nausea, vomiting, and tenderness and rigidity in the right lower quadrant of the abdomen, the most important factor indicating surgical appendicitis is a history of persistent diffuse epigastric midline pain present at the onset. It is to this region that the primary intrinsic pain stimuli are sent. Also important is a history of recurrent attacks of abdominal pain.

In the *differential diagnosis*, inflammation of Meckel's diverticulum and volvulus of the small gut are indistinguishable from acute appendicitis. In

a sophisticated subject, acute salpingitis may be confusing, as the patient will deliberately place the intrinsic midline pain higher than it is. All other intraabdominal conditions are excluded by the history, which is often of much greater value than the findings. A history of diffuse epigastric midline pain which has persisted for several hours and is associated with the other findings of acute appendicitis almost always signifies an obstructive appendicitis requiring immediate operation.

C Wallerstrom (*Deutsche Ztschr f Chir* 235 635 (Apr 7) 1932) discusses the *Rovsing sign* in acute appendicitis and calls attention to its diagnostic value. Rovsing's sign consists in a sensation of pain on the right side of the abdomen at the site of the appendix evoked by light pressure in the left iliac fossa. The author procured the best results by slowly pressing the soft parts over the colon downward with the fingertips and then quickly releasing them. The sensation of pain at the site of the appendix occurs at the instant of release. *Perman's method* of light downward pressure in the left iliac fossa in the direction of the right side of the abdomen was also used with better result than the original pressure and massage method of Rovsing. From investigations made in 211 operative cases of acute appendicitis, Rovsing's sign was exhibited by 70 per cent. This sign was positive in a higher percentage of cases in gangrenous appendicitis than in simple appendicitis.

Of the other appendicitis symptoms, only pain on the right side of the abdomen and direct local pressure sensitivity in the right iliac fossa compare with Rovsing's sign in frequency. Rovsing's sign is frequently positive when other appendicitis symptoms are negative. It

is probably evoked by a pressure transmitted from the left to the right side of the abdominal cavity and is probably comparable to direct pressure sensitivity, although the mode of producing the pressure is somewhat different. The occurrence of Rovsing's sign is probably favored by a medial or lateral position of the appendix. The sign is not specific for appendicitis, as it may be found in other localized disturbances of the peritoneum. It is a means of differential diagnosis between extraperitoneal and intraperitoneal disease conditions. Negative result of Rovsing's sign does not exclude appendicitis, but when positive, this sign is a valuable aid to diagnosis and indicates that the pathologic changes are in the appendix. There are cases in which the positive Rovsing sign is the only unequivocal symptom of appendicitis.

G. P. La Roque (Am J M Sc 182:191 (Aug.) 1931) has observed *Brittain's pathognomonic sign of gangrenous appendicitis* in 500 cases of this disease and has noted its absence in more than 300 other acute abdominal conditions, such as intestinal obstruction, cholecystitis, kidney and ureteral colic and functional colicky pains following dietetic indiscretions. In July, 1928, R. Brittain, an interne in the Richmond Memorial Hospital, made the original observation in a case which was later proved to be gangrenous appendicitis, that pressure over the appendiceal area (McBurney's point) resulted in retraction of the right testicle into the upper part of the scrotum. Since this observation, the sign has been elicited in every case later proved to be gangrenous appendicitis. If the sign is absent, the need for operation for this disease is not imminent. In widespread peritonitis, from whatever cause, one or both

testicles may be retracted, remaining in that position regardless of the presence or absence of pressure over the appendix site.

The author assumes that this test is a manifestation of muscular contraction involving the internal oblique and its cremaster portion, which surrounds the spermatic cord and draws the testicle up.

According to J. A. Cahill, Jr. (Med Ann District of Columbia 1:149 (June) 1932), a definite gurgling, crackling or crepitant sensation or local borborygmus can be detected on palpation in the right lower quadrant of the abdomen in any inflammatory condition about the head of the cecum, particularly acute appendicitis. This sign appears early and must be found before definite rigidity of the right rectus muscle occurs. It is almost constant in the retrocecal or adherent types of acute appendicitis. It is of great aid and most valuable in the diagnosis of the atypical case and especially in acute appendicitis in children and young adults.

Anomalous forms of appendicitis are described by Hembrow (M. J. Australia 1:847 (June 18) 1932), who reviews typical cases of appendicitis in which the signs and symptoms may be on the side opposite to that occupied by the cecum. These occur predominantly when the appendix lies to the left of the median line of the abdomen. In a vague abdominal crisis, when the symptoms and signs are referred to the left iliac fossa, appendicitis should be suspected. Transposition should be looked for and excluded. The McBurney incision should not be used in these cases to open the abdomen.

Diagnosis of Chronic Appendicitis.—In the diagnosis of chronic appendicitis, R. P. Watkins (New England Med. 207:335 (Aug. 25) 1932)

feels that careful questioning and physical examination of an intelligent patient will give the most useful information. The greatest difficulty in this is a proper evaluation of the psychic and nervous elements. If a patient gives a history of repeated attacks of pain and soreness in the right lower quadrant, even though they be very slight and not at all disabling, and if he has had one attack with vomiting and disabling pain and soreness, the author considers that the appendix should be removed.

M. W. Mettenleiter (*Am J Surg* 17:69 (July) 1932) has paid particular attention to the condition of the abdominal wall in cases complaining of pains in the region of the appendix. He tests the thickness of the skin and adipose tissue on corresponding spots of the right and left sides between the anterior superior iliac crests with the thumb and index finger. The author points out that there is often a marked difference in the thickness of the two sides, the right side being decidedly thinner than the left. Whenever this difference was found, the operation revealed pathologic changes of the appendix or of the cecum.

X-RAY DIAGNOSIS—E. Berla (*Clin chir* 34:1202 (Nov) 1931) reviews the history of the x-ray study of the appendix and discusses the physiology of the organ, the various theories regarding its importance, its contractile, secretory, and protective functions (protection by its lymphoid tissue against intestinal invasion), its function as an eliminator of organisms, and its endocrine function.

Of 163 cases in which Berla attempted to examine the appendix with the x-ray by the use of a barium mixture, the shadow of the organ was seen

at the first examination in 83 and in some in which the findings were negative at the first examination, a distinct shadow of the appendix was obtained at a second examination. When irregularity of form, kinks, spirals, constant changes of position, or an irregular filling shadow of the lumen was found, the presence of a pathological condition was assumed. The diagnosis of functional disturbances was based on the emptying time of the organ, but no definite time schedule could be determined. Painful points on the abdomen where the appendix shadow was projected and an irregular form of the organ were regarded as indirect evidences of the disease. The author reports and discusses typical cases of different clinical types of subacute and chronic appendicitis.

In conclusion he states that the x-ray findings cannot be regarded as of absolute value because from 60 to 90 per cent of normal appendices are visible on x-ray examination. These examinations are rendered difficult by many factors which are hard to eliminate in such an organ, and the differences in the technic render statistics valueless. Therefore, in the decision as to whether operation is indicated or not, the x-ray findings must be interpreted in the light of the clinical findings.

The morphologic details derivable from an x-ray examination of an injected appendix have only a coadjuvant value for the diagnosis of appendicitis, in accordance with the researches of G. Becchini (*Riv di clin med* 32:641 (Aug 15) 1931). They do not constitute specific pathognomonic signs, owing to the fact that most of such details may be simulated by the presence of endoappendicular fecal deposits. Of the functional signs, one, *i. e.*, evacua-

tion, has weight in completing the diagnosis and, more particularly, the greater or less delay with which evacuation is accomplished as compared with cecal evacuation.

No value is attached to the mode of filling, as that is not an expression of appendicular functioning. The reduced or abolished appendicular motility is a sign of great value as the pathogenesis in most cases is connected with adhesions and exudative formations. To the various reflex colic signs no diagnostic value can be attributed, owing to their lack of specificity for the disease in question. The epigastric pain that is elicited on pressing the appendix or its pain spots is of great diagnostic value. The diseased appendix fills more rapidly with the opaque medium than does the normal appendix.

MORTALITY.—F. B. Gurd (Canad M A J 27 360 (Oct) 1932) points out that there is much evidence available to support the view that the death rate from appendicitis is, at best, not diminishing. Statistics from numerous sources would indicate a general mortality rate from appendicitis, in first-rate clinics, in the neighborhood of 5 per cent and in perforated cases approximately 14 per cent, or higher.

A report from the records of the Worcester City Hospital by Watkins (*loc cit*) covers all cases during 15 years from 1914 to 1929, a total of 3730, and divides them into 5-year periods. This includes 288 cases with diffuse peritonitis in which, of course, the mortality was very high, *i e*, 31.9 per cent. The total mortality for the whole series was 3.9 per cent, for the first 5-year period, 4.6 per cent; for the second 5-year period, 4.05 per cent; for the third 5-year period, 3.2 per cent.

This shows a material decrease in

mortality for each 5-year period. From the same report he finds 1345 chronic cases with a mortality of 0.74 per cent, while 2385 acute cases have a mortality of 5.6 per cent.

The mortality rate of appendicitis for the 25 largest cities in the United States for 1930 is cited by J. O. Bower (J A M A 99 1765 (Nov 19) 1932) as follows:

	Population	Deaths	Rate
Philadelphia . . .	1,953,423	282	14.4
Portland, Ore . . .	303,600	44	14.5
Seattle . . .	300,552	54	14.7
San Francisco . . .	636,800	96	15.1
Indianapolis . . .	365,130	56	15.3
Los Angeles . . .	1,250,857	191	15.3
Jersey City, N. J . .	317,254	50	15.8
Rochester, N. Y . .	328,762	52	15.8
New York . . .	6,991,957	1110	15.9
Pittsburgh . . .	701,974	115	16.4
Cleveland . . .	902,450	155	17.2
Baltimore . . .	806,297	147	18.2
Chicago . . .	3,389,508	618	18.2
Detroit . . .	1,576,124	295	18.7
Columbus, Ky . . .	308,843	58	18.8
Buffalo . . .	575,088	112	19.5
Washington, D. C. . .	487,824	98	20.1
Milwaukee . . .	580,596	119	20.5
St. Louis . . .	822,909	175	21.3
Boston . . .	781,828	168	21.5
Newark, N. J. . .	422,874	100	22.6
New Orleans . . .	460,152	106	23.0
Minneapolis . . .	465,979	108	23.2
Cincinnati . . .	452,130	109	24.1
Kansas City, Mo. . .	401,207	106	26.4

Bower points out that delay and laxative, the prehospital factors responsible for the increasing high mortality in acute appendicitis, can be favorably influenced by educating the public.

According to G. L. Steele (New England J Med. 207:341 (Aug. 25) 1932), who comments on the medical aspects of appendicitis, the surgical technic and postoperative care have improved so much that it seems unlikely that the surgeon can do much more to lessen the mortality of appendicitis, unless it be closer control of the occasional

operator It appears that the burden must for the most part be shouldered by the medical man and the patient

TREATMENT.—*When to and when not to operate* is discussed by P W Willis (West J Surg 40 195 (Apr) 1932), who emphasizes the importance of diagnosis in both acute and chronic appendicitis With surgical facilities at hand (with few exceptions), prompt operation is indicated in acute appendicitis In chronic appendicitis (with very few exceptions) it is not indicated When patients have had repeated attacks of acute appendicitis, an interval operation is the proper procedure And finally, when the abdomen is opened for any cause, it is a good procedure to remove the appendix if it will not apparently increase the dangers of the operation

According to F B Gurd (Am J Surg 17 52 (July) 1932) in no case of acute appendicitis accompanied by peritonitis, abscess formation, or gangrene, should operation be postponed in the hope that a more suitable period for operation may be arrived at Supportive treatment can be equally well carried out after the major focus of infection has been eliminated and after an opportunity has been given for evacuation of toxic material

Technic—Gurd (*loc cit*) uses a transverse incision placed above the anterior superior spine Adequate exposure can thus be obtained without the risk of injuring the musculature or nerve supply of the abdominal wall

If prior to incision of the peritoneum the wound in the abdominal wall be properly prepared and bipped, ultimate infection of the wound can be avoided

In every case, the appendix should be removed, or at least that portion attached to the cecum, and the stump

ligated As a rule, it is advisable to attempt to bury the stump

In all severe cases, particularly those in which gangrene is present or in which the patient's life appears to be in jeopardy, a technic whereby the abdominal wound is left unsutured and the whole area involved in the inflammatory process packed with liquid paraffined gauze, to which bipp has been added, has in the author's hands appeared to be followed by a distinct lessening in the mortality rate Later closure of such wounds should be accomplished after 4 to 10 days by delayed primary, or by secondary, suture, with the return of the abdominal wall to normal

The technic described has appeared to lessen the number of deaths, has reduced by at least one-third the number of hospital days required for treatment, and has eliminated the accidental development of fecal fistulæ and of post-operative herniæ

Liza (Rev med Cubana 43 649 (June) 1932) states that appendectomy can be performed with good results, even in grave cases, by placing the patient in the left dorsolateral position for the operation

The patient (with the arms raised over the head) lies in the left dorsolateral position inclined at an angle of about 45°, with a bag of sand or a pillow in the angle formed by the table and his back, in order to maintain the same position all through the operation Under the influence of the patient's position the mobile viscera are displaced toward the left (the opposite side to that on which the operation is going to be performed) The cecum, being a semimobile organ, is displaced to the left only to a slight degree It is preferable to localize the cecum by percussion and to make the incision (a small opening) along a line corresponding to its internal border, near its fundus, *i.e.*, at a distance of about 1 inch (2.5 cm) from the

spina iliaca toward the appendicular region. The cecum can be identified by applying a separator of Farabeuf to either of the borders of the small incision. The appendix can be exteriorized and removed by this technic in a few seconds, thus, any unnecessary manipulation is avoided (except in cases of adherent retrocecal appendix or when there are some other complications). With this simple technic, appendectomy can be done under local anesthesia.

A method for demonstration of a perforation of the appendix is described by B. H. Steinberg (*Arch of Path* 12: 598 (Oct.) 1931). The author points out that perforations in *gangrenous appendices* are not as easily demonstrable as is believed. In his experience, gangrenous appendices that presumably should be perforated, were not, and *vice versa*. Even the histologic picture is frequently deceptive. What appears to be a frank necrosis involving all the coats of a part of an appendix fails to reveal a perforation. The method suggested makes possible the determination of a perforation and the localization of the lesion.

An ordinary 5- or 10-c.c. syringe is partly filled with a weak solution of eosin. A needle, attached to the syringe, is introduced into the lumen of the appendix through its proximal end. A hemostat is applied over the appendix and needle to keep the latter in place and to prevent the escape of the eosin. The hemostat is applied over that part of the appendix which shows the hemostat markings made by the surgeon. The piston of the syringe is gently pushed down so that the eosin solution runs into the appendiceal lumen. At the point of perforation, the eosin escapes through the wall and marks the point of the perforation. This method of filling the appendix was found preferable to the introduction of the fluid by gravity. The slight pressure exerted was not found to produce artificial perforations in gangrenous appendices. If a permanent record is desired of the perforation and its location, iodized poppyseed oil, 40 per cent, may be introduced instead of eosin and an x-ray taken.

APPENDICITIS IN CHILDREN.

—The importance of appendicitis in children is attested by the mortality statistics of Massachusetts, where, from 1926 to 1930 it was eighth in the causes of death in children from 1 to 8 years of age, inclusive. The mortality rate of this disease has increased from 0.5 per cent in 1900 to 4.9 per cent in 1930. H. W. Hudson, Jr. (*N. England J. Med.* 207: 225 (Aug. 11) 1932) acknowledges that this increase may be due in part to a greater accuracy in recording causes of death, but points out the need of instructing the public in the importance of securing medical attention at once in suspected cases.

R. M. Kempton (*J. Michigan M. Soc.* 31: 188 (Mar.) 1932) stresses the fact that the possibility of appendicitis should be kept in mind regardless of age. Appendicitis is a rare disease in the first year of life, somewhat more frequent in the second year, and gradually increases in frequency during the years of early childhood and young adult life. Owing to indefinite symptoms, difficulty of careful abdominal palpation, and failure to have the condition in mind, it is likely that many cases go undiagnosed during the first 2 years of life. Abdominal palpation, together with white and differential blood counts, should be routine in all cases with symptoms of vomiting or abdominal pain. Rectal examination and examination under light anesthesia may be useful aids in making the diagnosis.

According to H. Werthmann (*Zentralbl. f. Chir.* 58: 1943 (Aug. 1) 1931), acute appendicitis in children is very rare, only about 30 cases having been recorded. According to Aschoff, it is usually due to bacteria from the intestine. The parts which are physiologically or pathologically narrowed are those

most readily affected. As the site of the condition is determined chiefly by mechanical factors and their relationships to the lymphatic tissues, the rarity of acute appendicitis in childhood is explained. The wide smooth lumen and the absence of furrows and folds do not prevent stagnation of the contents and bacteria. The course of the illness is always severe. Because of the incomplete development of the lymphatic filter and of the mesentery, and because of the slight resistance of the peritoneum, encapsulation does not occur until late, if at all. The younger the child, the greater the danger. In the first year of life the mortality is about 100 per cent, in the second year 72 per cent, and later it is 11.7 per cent.

DIAGNOSIS—J. S. Horsley, Jr. (Virginia M. Monthly 59:165 (June) 1932) emphasizes the importance of early diagnosis and surgical intervention in infants and children. Two factors which make the diagnosis more difficult in children are: (1) the constitutional reaction may be so marked that the abdominal symptoms are obscured, and particularly so if the appendix is misplaced, and (2) abdominal pain may be associated with an acute febrile condition originating outside of the abdomen. Horsley states that the usual signs and symptoms occur in the following sequence: (1) abdominal pain, (2) nausea and vomiting; (3) tenderness, (4) rigidity, (5) fever and increased pulse rate, and (6) leukocytosis. "If nausea and vomiting precede pain, appendicitis may be ruled out and one should think of such conditions as scarlet fever, measles, meningitis, etc."

He mentions certain of the "signs" of appendicitis which may be of aid in making the diagnosis. *Aaron's sign* is a sensation of pain or distress in the

epigastrium, umbilical region, or left hypochondrium, which is produced by continuous firm pressure with the tips of the first 3 fingers over McBurney's point. *Blumberg's sign* is supposed to indicate active peritonitis. Sharp pains are elicited by quickly removing the hand from the abdomen after pressure has been made. After the inflammation has subsided, the pressure pain exceeds that produced by the release. *Brittain's sign* is a retraction of the right testicle produced by palpation of the right lower quadrant, with a return of the testicle to its normal position when the pressure is removed. This phenomenon is supposed to occur only when there is a gangrenous appendix. The author believes that this sign is helpful, but not always pathognomonic, nor even constant. To elicit *Meltzer's sign* the patient is examined while lying flat on the back with the right leg extended, the left knee partly flexed, and the arms elevated. If pain is elicited by pressure over McBurney's point while the extended leg is slowly elevated, it is supposed to be due to the impinging of an inflamed appendix between the abdominal wall and the body of the psoas muscle.

Some of the difficulties in the diagnosis of appendicitis in infants and children are pointed out by H. Aron (Med. Klin. 28:639 (May 6); 678 (May 13) 1932). He calls attention to the conditions which may simulate appendicitis, such as abdominal tuberculosis, pneumonia, acute articular rheumatism, and umbilical colic, and groups them under the designation, *pseudoappendicitis*. Operation is to be avoided in such instances. Intussusception and pneumococcal peritonitis may likewise simulate appendicitis, although errors in diagnosis are not so important, since

early operation is distinctly to be desired in the former and does not have serious consequences in the latter, and may even be helpful in the acute fulminating variety

On the other hand, acute appendicitis may occur in conjunction with some other infection. This he terms *concomitant appendicitis*. When it is a part of a measles infection, he thinks operation is only advisable if there are symptoms of peritonitis. Appendicitis associated with tonsillitis may manifest itself in varied ways, and operation is indicated in the presence of suppuration. He advises against too early surgical intervention in suspected appendicitis and only after repeated examination and careful observation.

The importance of *percussion dulness* in the lower right quadrant in determining the presence of appendicitis in young children is emphasized by K. Hochsinger (Arch. f. Kinderh. 95:223 (Feb. 5) 1932). Particularly is this true in the early acute stage of the disease in very young children and in chronic appendicitis and periappendiceal irritations in older children when muscular resistance and pain are absent in the ileocecal region. The percussion should be gentle and performed with short quick taps, since the feeling of resistance is increased by this method. The area of dulness is bordered above by a line connecting the two anterior iliac spines, medially by a vertical line through McBurney's point and below by the groin. Normally, the percussion note in the comparable area of the left side is duller than on the right, so that when the dulness is greater on the right than on the left side, and particularly if other signs of appendicitis are present, the prognosis is more grave. The author reports a case in which other

signs pointed to an appendiceal infection but this percussion dulness was absent. He advised against operation and the x-ray revealed a freely movable appendix. The patient recovered.

COMPLICATIONS — *Hematuria* is not a common sequela of appendicitis. S. Wolff (Ztschr. f. Kinderh. 51:662, 1931) has collected 15 cases from the literature and reports 2 additional ones. A 10-year-old boy was allowed up on the tenth day after appendectomy and blood and casts were found in his urine on the eleventh day. These findings persisted for 8 days. A 5-year-old girl had a hematuria of 2 days' duration which began 4 days after appendectomy. Among the factors which have been suggested as possible causes are adhesions between the appendix and the urinary tract, embolism or thrombosis, congestion, toxic changes, or nephritis.

Urinary retention secondary to an appendiceal abscess is reported in a 4-year-old boy by H. L. Hoffman (Lancet 1:778, (Apr. 9) 1932). There was bladder distention and absence of micturition. Bilateral hydronephrosis and hydroureters were demonstrated by means of intravenous pyelography with abrodil. Drainage of the appendiceal abscess low in the pelvis adjacent to the neck of the bladder relieved the irritation. A subsequent (6 months later) intravenous pyelogram revealed normal renal pelves and ureters.

APPENDICITIS IN PREGNANCY.—The association of appendicitis and pregnancy is rare. A collection of obstetrical statistics by P. Garcia Amo (Arch. de med., cir. y especialid. 12:1031, 1931) shows that it occurred in 94 of 215,854 pregnancies, or once in 2300 pregnancies, and in a collection of surgical statistics it was

observed in 501 of 36,140 cases of appendicitis or once in 72 cases of appendicitis

On the author's service, 2 cases of appendicitis in pregnancy have been operated on within a year. In both, the appendicitis developed in the fifth month of the pregnancy. The first case was that of a woman, 23 years old, who was admitted to the hospital suffering from pain in the right iliac fossa and vomiting. Appendectomy was performed and the wound closed without drainage. Six days after the operation the patient had a chill and a high fever. On the ninth day the fetus was expelled spontaneously and the placenta was removed with forceps. On the twenty-sixth day the patient was discharged well.

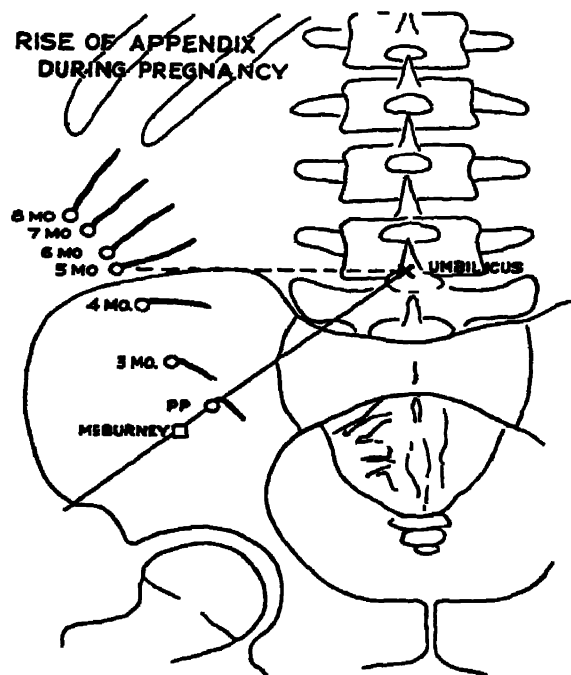
The second case was that of a woman who had suffered from nausea, vomiting, and pain in the right iliac fossa for 3 days before her admission to the hospital. Examination revealed rigidity of the lower two-thirds of the right half of the abdomen. The pain was most severe at McBurney's point. At operation, the appendix was found perforated. Appendectomy was followed by copious suppuration of the wound. On the twenty-eighth day abortion occurred and 2 days later the patient died.

The appendix is usually so displaced by the pregnant uterus that the maximum pain is rarely at McBurney's point. Vomiting occurs in only about half of the cases. Muscle rigidity is difficult to demonstrate and is less frequent than in the absence of pregnancy. There may be contraction of the uterus. Recognition of this fact is important to avoid confusing the condition with premature detachment of the placenta.

The author discusses the literature on the *treatment* of acute appendicitis in pregnancy and concludes that opera-

tion should be performed in all cases whether the attack is mild or severe and regardless of the length of time that has elapsed since its beginning. If possible, the wound should be closed without drainage. The pregnancy should not be interrupted unless abortion or delivery has already begun.

X-ray studies were made at regular intervals throughout pregnancy and the puerperium by J. L. Baer, R. A. Reis, and R. A. Arens (J. A. M. A. 98



Changes in position and direction of appendix during pregnancy. After the fifth month of pregnancy, appendix lies at the crest level and rises above this level during the last trimester. The postpartum position of appendix (pp) corresponds to its position in the nonpregnant state. Roentgenologically, the base of the appendix is usually found medial to McBurney's point. The average position of the umbilicus corresponds to the point at which a line extended horizontally from the iliac crest crosses the spine (Baer, Reis and Arens Jour Am Med Assoc)

1359 (Apr 16) 1932) in 70 pregnant women with normal appendices. It was found that the appendix undergoes progressive displacement upward after the third month, reaching the level of the iliac crest at the end of the sixth month. It was further found that the long axis

of the appendix undergoes a counter-clockwise rotation, first, becoming horizontal and pointing medially and, finally, pointing vertically in 60 per cent at the end of the eighth month. By the end of the tenth day postpartum the appendix has returned to its normal position; in many instances it is lower than normal at this time, probably as the result of the general abdominal relaxation.

Twenty-eight instances of appendicitis complicating pregnancy were analyzed. These occurred among 16,543 deliveries, an incidence of 0.17 per cent, and among 1700 appendectomies in adult women, an incidence of 1.7 per cent. The onset in 50 per cent was observed during the second trimester of pregnancy at the time of beginning appendiceal displacement.

All types of pathologic change showed a frequency closely comparable to the incidence in the nonpregnant, except gangrenous and perforative appendicitis, which occurred $5\frac{1}{2}$ and $3\frac{1}{2}$ times more frequently, respectively, in the presence of pregnancy. Early diagnosis is often obscured by a misinterpretation of abdominal pain with or without nausea and vomiting as the usual accompaniment of advancing pregnancy. This results in the increased incidence of the more advanced and serious types of appendicitis.

Prompt diagnosis and prompt surgical intervention offer the most favorable outcome to both mother and fetus. Abortion and premature labor are more apt to occur when the infection is no longer limited to the appendix but has invaded the peritoneal cavity. The later the onset in the course of the pregnancy, the greater is the risk of premature labor.

There is only one treatment for appendicitis, *viz.*, prompt surgical removal

regardless of the presence of the pregnancy. The pregnancy, on the other hand, should be left undisturbed regardless of the severity of the appendiceal involvement or of the advanced state of the pregnancy.

APPENDIX. — APPENDICOSIS.—Degenerative lesions of the appendix (*appendicosis*) hitherto undifferentiated from appendicitis, are described by B. Steinberg (Am. J. Clin. Path. 1:339 (July) 1931). The observations are based on a study of 1500 surgically removed appendices. As a result of this study, a group of appendices in which inflammation played no part in the pathological picture was differentiated. The abnormal changes were retrogressive and degenerative in character and terminated in death of tissue. The term *appendicosis* is proposed to designate the pathologic changes in these appendices.

The author makes a pathological classification of degenerative and inflammatory diseases of the appendix:

1. Appendicosis:
 - (a) Mucosal erosion type.
 - (b) Pressure atrophy type.
2. Appendicitis:
 - (a) Mucosal ulcer type.
 - (b) Mucosal appendicitis.
 - (c) Diffuse appendicitis.
 - (d) Gangrenous appendicitis with or without perforation.
3. Appendolithiasis.
4. Appendiceal fibrosis:
 - (a) Focal type.
 - (b) Diffuse type.

A clinical classification of degenerative and inflammatory diseases of the appendix:

1. Appendicosis.
2. Appendicitis:
 - (a) Mucosal ulcer type (questionable of clinical diagnosis).
 - (b) Diffuse type.
 - (c) Gangrenous with perforation.

3 Appendolithiasis (clinical diagnosis presumptive only)

Steinberg differentiates appendicosis pathologically and clinically and names signs and symptoms that may be ascribed to this pathologic entity

TUMORS—R Carnelli (Arch ital di chir 30 158, 1931) reports a clinical and pathological study of 3 rare lesions of the appendix. In the first case reported, that of a boy 20 years old, there was a primary alveolar *carcinoma* of the tip of the appendix which had perforated. The end of the appendix was hard, and free gelatinous fluid was present, but there was no lymphatic extension. When the patient was followed up 11 years after the operation, he was found well.

The second case was that of a boy 10 years old, who entered the hospital with the diagnosis of acute appendicitis. At operation a small amount of free yellow fluid was found. The appendix was retrocecal and so buried by the inflamed adherent cecum that amputation of about 1 cm of the end of the cecum was necessary to effect closure. The patient was well 14 months later. Histological examination of the appendix revealed a primary round-celled *sarcoma*. The patient's mother had had her left arm amputated for sarcoma of the humerus.

The third case was that of a patient 27 years old who had primary hypertrophic *tuberculosis* of the appendix.

The author presents an interesting review of the literature on these unusual but important conditions and discusses the pathology. He states that at operation *sarcoma* is often confused with granuloma and laboratory aid is usually required to make the diagnosis certain. In doubtful cases the cecum itself may be resected. When secondary involve-

ment of lymph nodes is absent, the prognosis after appendectomy is good.

Carcinoma of the appendix in a girl of 20 is reported by W E Darnall and R A Kilduffe (Am J Surg. 17 63 (July) 1932). The authors quote Batzdorf who listed 186 recorded cases. The age incidence is from 5 to 80 years, but most of the cases occur in the third decade. They point out that extension of the process is relatively uncommon, occurring in about 6 per cent of cases. The mesenteric and retroperitoneal nodes first become involved. The histological diagnosis in Darnall's case was alveolar carcinoma.

I G Moreno (Arch argent de enferm d apar digest 7.53, 1931) reports a case in which, when the sac of an inguinal hernia on the right side was opened at operation, white, gelatinous, translucent material was found in the peritoneal cavity. The appendix could not be discovered. In its place was a large tumor of the cecum which necessitated ileocecal resection. The specimen did not correspond to any of the descriptions of pseudomyxoma of the appendix in the literature, for in the cases on record the fundamental lesion was a hyperplasia of the glandular layer of the appendix, whereas in this case there was a blastomatous newgrowth, a mucous *cystadenoma* of the appendix. *Pseudomyxoma* of appendicular origin is of 3 types. (1) pseudomyxoma of the appendix due to glandular hyperplasia; (2) pseudomyxoma of the appendix due to adenomatous formation, and (3) pseudomyxoma of the peritoneum resulting from one of the former conditions.

From the microscopical findings Moreno concludes that the wall of the cecum, and especially the wall of the appendix, contains a series of glandular

proliferations of typical epithelial cells which are of a cystic character and filled with mucous material. He believes that in the mucosa of the appendix there are chronic irritative foci, and that the adenomatous newgrowth occurs as the result of the repeated exacerbations of these foci.

Pseudomyxoma of the appendix is most common between the ages of 30 and 60 years, and occurs more frequently in males than in females. Race is of no special importance in its incidence. When it is the result of glandular hyperplasia, the chief cause is probably inflammation. To explain the origin of the mucous cystadenoma, the Cohnheim-Ribbert and Virchow theories are necessary. In pseudomyxoma of the appendix due to glandular hyperplasia, the chronic inflammatory state of the mucosa which tends to obliterate the cecal ostium of the appendix leads to the formation of lesions comparable microscopically to those found in the polypos colitis of Virchow. To these are added the hyperproduction of mucus and its retention in the lumen of the appendix, which result in the formation of a mucous cyst. In the author's opinion, perforation occurs as the result of the pressure of the mucus within the cyst.

Pseudomyxoma of the appendix has no pathognomonic symptoms. A pre-operative diagnosis is possible only in exceptional cases.

Moreno divides the evolution of the condition into 3 stages as follows:

1. Period of onset. This is usually symptomless and may extend over many years. If the abdomen is opened following an attack of appendicular pain during this period, evidences of a process of long standing will be found. During this period also there may be a

movable mass which varies in size from time to time.

2. Period of initial symptoms.

3. Period of peritoneal involvement following rupture of the gelatinous material into the peritoneal cavity.

The condition must be differentiated from ovarian cysts, pelvic inflammatory masses in the female, the hypertrophic form of cecal tuberculosis, carcinoma or inflammatory tumors of the cecum, intestinal syphilis and actinomycosis, and peritoneal tumors.

The treatment is surgical and the prognosis is good.

MUCOCELE.—Seventy cases of mucocele of the appendix have been reviewed by C. Mayo, 2d, and J. U. Fauster, Jr. (*Minnesota Med* 15:254 (Apr) 1932). In their clinical analysis, no definite diagnostic point was revealed. The most significant facts were the history of distress and palpable mass in the right lower abdominal quadrant. With this present, mucocele of the appendix should always be considered. In uncomplicated cases, the condition is relatively benign. Although mucocele may be a primary type of malignant tumor, its growth is exceedingly slow and complicating factors are rare. Rupture of larger mucoceles frequently results in the formation of pseudomyxoma peritonaei. The treatment in the uncomplicated case is appendectomy, and the prognosis is good.

OCCCLUSION.—J. Llanibias and T. Malamud (*Prensa med.* 18:1575 (Apr. 30) 1932) made a study of 95 appendices (45 removed at operation and 50 at necropsy). Partial or complete occlusion was found in 5 appendices (11 per cent.) of the first series and in 12 (24 per cent.) of the second series. In both series the predominant neoformation was a fibroneuroma. The individ-

uals from whose cadavers the appendices were removed (with the exception of only 1 case) did not present at any time clinical symptoms which might have indicated, in some form, any pathologic condition of the organ. Occlusion of the appendix in those cases had not been suspected during the patient's life and it was an unexpected observation at necropsy. Occlusion of the appendix has no protopathic value in the determination of the so-called chronic appendicitis. The routine anatomicoclinical studies of parallel series of appendices removed at operation and at necropsy are important to make an estimation of the clinical value of occlusion of the appendix, by means of which a better understanding of some anatomicoclinical pictures observed in the pathologic conditions of the appendix may be obtained.

DIVERTICULA of the appendix, according to F. W. Mulsow (Arch Surg 24 923 (June) 1932) are more frequent than the reports in the literature would indicate. He observed 9 cases in the examination of 661 appendices during the past 2 years. The presence of a diverticulum in an appendix is of much more importance clinically than it has been considered to be by most writers reporting such cases. It appears that diverticula are more often the cause of sudden or unexpected perforations in so-called chronic appendicitis or recurring and acute appendicitis than is realized.

ARSENIC. — POISONING. — A case of bilateral herpes zoster following acute arsenic poisoning is reported by F. M. Jacob (Arch Dermat and Syph 24 280 (Aug) 1931). In addition to other characteristic signs of arsenic poisoning 18 days following the inges-

tion of flour containing arsenic, the patient developed the typical vesicles of herpes zoster with a bilateral distribution. Following elimination therapy, the eruption was practically healed within 1 week.

ARSPHENAMINE. — UN-TOWARD EFFECTS. — The presumption that arsphenamine predisposes to, or induces, the development of neurosyphilis, was not borne out by a study reported by P. A. O'Leary and J. R. Rogin (Proc Staff Meet, Mayo Clin 7 273 (May 11) 1932) who, in investigating 500 proved and unselected cases of neurosyphilis, found that 85 per cent of these patients had not received arsphenamine during the early period of the infection. According to these authors, even small amounts of arsphenamine are better than none as a protection for the nervous system of patients with acute syphilis, whereas early treatment in adequate amounts increases still further the percentage of patients whose nervous system is not affected. The modern treatment of neurosyphilis, in their opinion is of pronounced value in reducing to a minimum the clinical, serologic, and spinal fluid manifestations of the disease.

Five cases of various types of bone-marrow depression following the arsphenamines were observed by A. B. Loveman (Ann Int Med 5 238 (Apr) 1932). He believes that the term "agranulocytic angina" is inadequate and misleading and suggests that granulocytopenia is a better term. Inorganic arsenic, organic arsenic and benzene may each depress any or all of the elements of the bone-marrow. In the blood dyscrasias following the arsphenamines, the arsenic and benzene radicals are probably both responsible. A pre-

disposed hematopoietic weakness or insufficiency which in any case may be erythropoietic, thrombocytopoietic or any combination of these, is perhaps an important secondary factor in the etiology of diseases of the bone-marrow following arsphenamine administration. A syphilitic factor affecting the bone-marrow is suggested as a possibility in the etiology of the blood dyscrasias in syphilitic persons. The most adequate treatment is *prophylactic*. Sodium thiosulphate and frequent small blood transfusions offer the best means at present for combating the condition.

A review of 2100 cases of syphilis in which the patients received arsphenamine therapy was made by R. A. Ireland (Am J Syph 16 22 (Jan) 1932), with particular reference to the types and prevention of reactions and complications due to arsphenamine administration. Of this number, 11.2 per cent had various symptoms of intolerance to arsphenamine. The probability of reaction is approximately twice as great in females as in males, even when dosage is proportional to weight. Arsphenamine, as usual, was responsible for a higher percentage of reaction. The most common type of reaction encountered was that of the gastrointestinal system with its various manifestations. No one type of syphilitic involvement appeared to predispose to intolerance. Of the reactions observed, 72.5 per cent occurred early in treatment between the first and the tenth injection. High dosage, rapid injection and insufficient dilution of arsphenamines tend to produce more frequent and more severe reactions.

Among the methods of *prevention of reaction*, preliminary administration of (1) **atropine sulphate** in adult doses of $\frac{1}{75}$ grain (86 mg) hypodermically;

(2) **epinephrine** hypodermically, (3) **ephedrine** by mouth, (4) **calcium gluconate** intravenously, and the use of vehicles other than distilled water are found to be the most promising. The Besiedka antianaphylaxis technic of dividing the dose, too, is often useful. Complete physical appraisal of the patient before treatment, and the use of preparatory treatment with heavy metal and **iodide** in patients with important syphilitic visceral disease, are important.

The prevention of reaction is important, since nearly one-fifth of the author's patients stopped treatment because of unpleasant or incapacitating complications. The pathogenesis of nearly all types of reaction is still obscure in spite of diligent studies into the modes of production. The author's review of the literature of the past 6 years reveals a large and diversified list of reactions, but the number of severe and fatal reactions is few when the large number of patients under treatment is considered.

E. D. Osborne, E. D. Putnam and B. S. Hitchcock (Arch Dermat and Syph 25 419 (Mar.) 1932) note that arsphenamine given to rabbits in therapeutic doses is rapidly metabolized and eliminated, with no evidence of appreciable storage. No appreciable amount of arsenic is found in the parenchyma of the central nervous system of rabbits after the administration of arsphenamine, nearsphenamine or sulpharsphenamine. Following the administration of therapeutic and lethal doses of tryparsamide to rabbits, the parenchyma of the brain and spinal cord shows appreciable quantities of arsenic. The suprarenals are not storehouses for arsenic. If harm is done, it is due to vascular damage caused during the period of circulation of the un-

metabolized arsphenamine The lack of any appreciable storage of arsenic in any of the organs, except the liver and the organs of excretion, suggests that most of the drug is in the vascular system prior to metabolism in the liver In comparing the observation following the administration of arsphenamine, neoarsphenamine and sulpharsphenamine, the evidence points to neoarsphenamine as being the least toxic, since it is present in the liver in large quantities at 1 hour and at 24 hours following a lethal dose, and it is being metabolized in sufficient quantities to appear in maximum amount in the organs of excretion Sulpharsphenamine appears to be the most toxic At the 1 hour interval following a lethal dose, something has occurred to prevent the liver from metabolizing the drug

No sulpharsphenamine appears in the organs of excretion, and little is found in the liver. At the end of 24 hours the liver contains a maximum amount of arsenic, but the organs of excretion contain relatively little. In lethal doses, tryparsamide apparently requires little or no metabolizing in the liver, but is excreted rapidly by the kidneys and the entire intestinal tract Over a period of 48 hours after the administration of a lethal dose, the liver takes up an increasing amount of arsenic, the amount of which seems to parallel the degree of damage to the liver

The development of *polyneuritis* following neoarsphenamine therapy of syphilitic icterus was observed by A Olivet (Deutsche Ztschr f Nervenheilk 123 288 (Jan 21) 1932), who gives the clinical histories of 2 syphilitic cases who, following the development of the primary lesion, underwent a neoarsphenamine-mercury, or a bismuth treatment Five months later there developed an

hepatic relapse with icterus, and the Wassermann reaction was weakly positive A second neoarsphenamine-bismuth treatment was instituted and as a result the icterus disappeared and the Wassermann reaction became negative Toward the end of the second treatment, from 6 to 7 months after the primary lesion, a prolonged polyneuritis developed, the Wassermann reaction in the blood remained negative but in the cerebrospinal fluid it was found positive In the beginning, the polyneuritis was progressive, later, there was a slow but almost complete recovery Syphilitic symptoms did not recur In discussing the pathogenesis of the polyneuritis, the author reaches the conclusion that the decisive factor was that the neoarsphenamine treatment was carried out during an impairment of the renal parenchyma The liver was not able to decompose and to detoxicate the substance and thus the neoarsphenamine exerted a toxic neurotropic action On the basis of these experiences the author advises caution in the neoarsphenamine treatment of syphilitic icterus To avoid similar injuries, he recommends the trial of small doses of neoarsphenamine and a close watch for the first signs of polyneuritis, such as pains, paresthesias, sensibility disturbances and weakening of the tendon reflexes

ARTERIAL DISEASES OF EXTREMITIES.—During the past few years more attention than formerly has been given to the common arterial diseases In the past, consideration of peripheral arterial disease was limited almost entirely to the end-stages, *i e*, actual or threatened gangrene, but now, through the stimulation of various studies of the physiology of the circula-

tion, physiologic function rather than structural change is recognized as being of predominant importance in determining the outcome and the effects of various forms of therapy in this type of disease.

It is well recognized that the circulatory deficiency in peripheral artery disease is dependent on one or both of 2 factors, *vis*, (a) mechanical organic obstruction, and (b) vascular spasm. Not infrequently, the making of an accurate diagnosis of the actual condition present, is an extremely difficult matter. However, in recent years, through the development of various satisfactory methods for the differentiation of these 2 elements, much progress has been made in treatment, and the attitude of hopelessness in respect to arterial diseases of the extremities has been gradually disappearing.

CLASSIFICATION.—In any case of peripheral arterial disease the symptoms presented are dependent on an impairment in the local circulation. The most important signs and symptoms of circulatory deficiency are claudication, pain or other sensory changes, work and postural ischemia, dependent rubor, the "angle of circulatory efficiency" (Buerger), temperature changes, diminution or absence of arterial pulsation, and trophic changes such as actual or threatened gangrene, muscle atrophy, thickening and inelasticity of the skin.

H. E. Pearse, Jr (J. A. M. A. 98: 866 (Mar 12) 1932) recommends that the classification of each case should be made on the history, physical examination, laboratory procedures and observations on the following points: (1) location and extent of gangrene, if it is present, (2) color of tissues in the elevated, horizontal and dependent positions, (3) presence or absence of

edema or infection, (4) character of the pulsation in the arteries of the limb, (5) rate of return of circulation after blanching by pressure, (6) apparent temperature of the extremities; (7) amount and character of pain, (8) appearance of the skin and nails; (9) presence or absence of muscle atrophy. Also the following supplementary procedures may be undertaken: (1) intradermal saline test, (2) Pachon oscilometer, or recording sphygmomanometer readings; (3) temperature readings, with or without nerve block, (4) x-ray treatment for calcification of vessels, (5) photograph or drawing to show exact extent of disease; (6) Moszkowicz's hyperemia test, and the intradermal histamine test (which have occasionally been used); (7) capillary microscopy (unsatisfactory because of the thickening of the epidermis in these cases).

J. J. Mouton and W. J. M. Scott (New England J. Med. 204: 955 (May 7) 1931) divide arterial diseases in the peripheral vessels into 3 main groups. In the *first group* there may be no change in the vasoconstrictor gradient after tests, indicating an entire absence of vasospasm, the condition apparently being due to organic occlusion alone. This group includes the majority of cases of senile and diabetic gangrene; however, the mere presence of diabetes or arteriosclerosis does not signify that spasm might not be an important element. The *second group* is one in which the vasoconstrictor gradient can be completely obliterated by certain tests. [These tests will be discussed later.—Ed.] The surface temperatures everywhere rise at least to the lower limits of the normal vasodilatation level, indicating an entire absence of organic occlusion.

The physiological response is seemingly that of pure vascular spasm. This group includes the majority of cases of mild Raynaud's disease, a number of cases of traumatic and irritative lesions of the blood-vessels, and also probably the early stages of thromboangitis obliterans. In the *third group* there is a mixture of the two reactions, both occlusion and spasm occurring in varying proportion in each case. It includes a majority of the presenile types of arterial disease, such as thromboangitis obliterans in the stage in which it is most commonly seen.

TESTS FOR OCCLUSION AND SPASM OF THE PERIPHERAL BLOOD-VESSELS.—In the study of the vascular diseases of the extremities, it is of paramount importance to distinguish the effects of sympathetic vasoconstrictor activity and of organic arterial obliteration.

The *normal vasodilatation level* has been determined by the use of general anesthetics, by spinal anesthesia, and by conduction block anesthesia of peripheral nerve trunks. According to J. J. Morton and W. J. M. Scott (*Ibid*), the lower limits of this level for general or spinal anesthesia at a room temperature of 20° C (68° F) is 31.5° C (88.7° F), and for conduction block anesthesia it is 30.5° C (86.9° F). In peripheral artery disease, the difference between the surface temperature readings of the affected extremity during anesthesia and the normal vasodilatation level is a measure of the element of mechanical occlusion (*the occlusion index*). In an individual case, if anesthesia is accompanied by no elevation of temperature in the cool distal portion of the extremity, occlusion without spasm is present, if the skin temperature reaches the normal vasodila-

tation level, sympathetic vasoconstriction is responsible for the circulatory symptoms, and if the elevation is definite but not to the normal level, both occlusion and spasm participate. Nerve block anesthesia is particularly useful in this vasomotor test because of its simplicity and freedom from discomfort. In doubtful or borderline cases, its results should be checked with those of spinal or general anesthesia.

W. J. M. Scott and J. J. Morton (J. A. M. A. 97:1212 (Oct 24) 1931) advocate the use of *procaine block of the posterior tibial nerve* for the differentiation of arterial spasm and occlusion in ambulatory patients. (The posterior tibial nerve furnishes the cutaneous innervation of the sole of the foot and the plantar surface of the toes, and the most severe circulatory disturbance and the most marked spasm in peripheral vascular disease usually manifest themselves first in the toes.) In order to establish the response of normal vessels to this procedure, the nerve was anesthetized with procaine in 17 medical students. About 10 minutes after the injection of the procaine the surface temperature began to rise in the area of cutaneous distribution of the nerve (Fig 1). The maximum surface temperature in the field of anesthesia averaged 31.2° C (88.1° F), in all cases coming within 1 degree of this figure.

All determinations were made under standard conditions in a room with constant temperature at approximately 20° C (68° F). The maximum surface temperature elevations obtained by this method were compared with those which accompany general anesthesia. After the maximum response to posterior tibial nerve block, the patient was given nitrous oxide-oxygen anesthesia.

Following the latter, the skin temperature of the toes reached a slightly higher level than after the nerve block, the difference being only 0.7°C (1.2°F) (Fig 1). This difference is in all likelihood due to the fact that the innervation of the main arterial trunks remains intact in nerve block anesthesia. The lower limit of the normal vasodilatation level by the nerve block method is

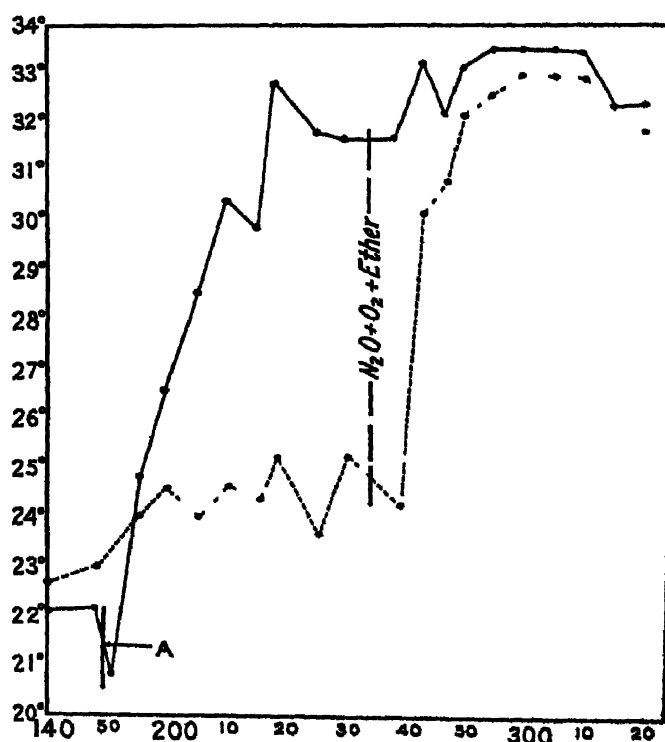


Fig 1—Comparison of the maximum surface temperature elevations produced by nerve block and by general anesthesia, the difference is less than 1°C , solid line, left toe, broken line, right toe, A, stage at which injection was made into the left posterior tibial nerve

30.5°C (86.9°F) (room temperature of 20°C — 68°F).

The *technic* of the test is, as follows.

With the patient at rest on a bed or table, with the feet and legs exposed to the knees, in a quiet room with temperature as near as possible to 20°C . (68°F), the temperatures on the toes and soles are taken at 5-minute intervals with the dermotherm. After the level of the surface temperature has been established (the surfaces are usually exposed at least 20 to 30 minutes), the posterior tibial nerve is blocked, just below the internal

malleolus, by the injection of from 8 to 10 cc (2 to $2\frac{1}{2}$ drams) of 1 per cent *procaine* solution about it.

The nerve, usually felt quite readily just behind the lower part of the internal malleolus, is followed as far as it can be easily palpated (usually to a point about 2 cm directly beneath the posterior border of the malleolus), and is immobilized by hooking the finger under it. The injection is made at the latter point in order to avoid injury to the vessels. The point of the needle must be under the deep fascia in the same compartment with the nerve, although it is not necessary to inject the *procaine* into the nerve itself. If the injection is properly made, loss of tactile sensation in the area of distribution begins within 15 minutes.

For the test to be valid, complete anesthesia to touch must be obtained. The surface temperatures are recorded every 5 minutes until the maximum is attained, which occurs usually from 15 to 30 minutes after the induction of a satisfactory anesthesia. The height of the surface temperature in the anesthetic area is then corrected for room temperature, 0.3°C . (0.6°F) being added to or subtracted from the reading for each degree by which the room temperature exceeds or falls below 20°C . (68°F). If the surface temperature of the toe has increased to equal or exceed 30.5°C . (86.9°F) vasoconstrictor spasm is the cause of the local circulatory deficiency. On the other hand, if there is no increase in the temperature following the nerve block, vasoconstriction plays no role in the vascular disease, or if there is a definite increase in the surface temperature, which fails, however, to reach the normal vasodilatation level, the condition belongs to the mixed group.

This method of differentiating the effects of vasoconstriction from those of occlusion, which thus far has been carried out chiefly on the leg is applicable also to the *upper extremity*. The ulnar nerve at the elbow or the median nerve just above the wrist may be blocked with *procaine*. If the hand is cool initially, the increase in temperature produced under ulnar anesthesia may be so marked that the difference between the two sides of the ring finger can easily be detected by palpation. From the authors' experience, the normal vasodilatation level of the hands is approximately the same as for the feet.

The severe cases of Raynaud's disease offer exception to this test for distinguishing arterial spasm and occlusion in that they may show no increase in the surface temperature, or one which falls far short of the normal vasodilatation level; however, in the more common vascular diseases the test is of definite diagnostic value

Vasodilatation in Response to Immersing in Warm Water.—J H Gibbon, Jr and E M Landis (J Clin Investigation 11 1019 (Sept) 1932) found that the vasodilator response in the lower extremities produced by immersing the forearms in warm water (43° to 45° C— 109.4° to 113° F) for 35 minutes is, except in acrocyanosis, practically identical with the vasodilatation resulting from spinal anesthesia, nerve block, or the injection of typhoid vaccine. In 10 observations on the spontaneously cool extremities of 6 normal subjects, the rise in digital temperature (measured thermoelectrically) began within 15 minutes after immersing the forearms in water. The skin temperature in all but 1 of these observations exceeded 32° C (89.6° F) by the twenty-ninth minute.

Warming 1 extremity only was found not always to produce complete vasodilatation in the other 3 extremities. Such partial responses were observed when 1 upper extremity was warmed only as far as the wrist, or when 1 lower extremity was warmed only as far as the ankle. The manner in which the subject was clad did not appear to exert any conspicuous effect upon the response at room temperatures of 20° and 16° C (68° and 60.8° F). In the opinion of the authors, the delayed vasodilator response accompanying occlusion of the circulation is strong evidence against the hypothesis that this

type of vasodilatation is due to a "reflex vasomotor excitation" (as suggested by G W Stewart) resulting from nerve impulses originating in the immersed limb. They believe that the vasodilator response depends on the return of warmed blood from the immersed extremity. In 3 experiments the rise in rectal temperature, produced by immersing 2 limbs in warm water (ranging from 0.1° to 0.6° C— 32.1° to 33.8° F), followed the appearance of subjective sensations of warmth. The small rise in rectal temperature suggests that the central nervous mechanism, which responds to warming of the body by diminishing vasoconstrictor tone in the extremities, is sensitive to very small changes in body temperature.

Studies were made on a patient with paraplegia due to transverse myelitis in whom pain and temperature sensations were lost anteriorly below the level of the seventh dorsal segment and posteriorly below the level of the tenth dorsal segment. Twelve minutes after immersion of the anesthetic legs in warm water at a temperature of 43° C (109.4° F) the patient felt warm and began to perspire. The temperatures of the fingers, originally 23.3° to 23.6° C (74° to 74.4° F) began to rise 15 minutes after the legs were immersed, and exceeded 32° C (89.6° F) by the twenty-ninth minute after immersion. The fact that the vasodilatation in the fingers occurred without sensation of warmth in the immersed extremities is offered by the authors as additional evidence that this type of vasodilatation is due to the return of warmed blood from the immersed limb.

T. Lewis and G W Pickering (Heart 16 33 (Oct) 1931) found the vasodilator response to warming the body to be absent in a sympathectomized

extremity and concluded, therefore, that the effector mechanism of vasodilatation lies entirely in the sympathetic nerves to the limb and is not antidromic.

Gibbon and Landis (*loc cit*) have found the test of definite value in distinguishing between organic occlusion and spasm of the peripheral blood-vessels of the lower extremities. If the digital temperature rises above 32°C (89.6°F), organic vascular occlusion can be definitely excluded, and if the digital temperature fails to rise, or rising fails to reach 32°C , the presence of organic obstruction is indicated, but the conclusion should probably be verified by some other method of examination.

Oscillometry—In discussing the value of oscillometry and measurements of surface temperature* in the study of peripheral vascular diseases, S. I. Simpson (*Am Heart J* 6 309 (Feb.) 1931) states that after some experience, *digital palpation* of superficial arteries offers no special difficulty. However, occasionally pulsation in the warm fingers of the observer may simulate pulsation in the patient's vessels; the pulsations of a posterior tibial artery may not be detected in a cold room, though quite obvious in a warmer atmosphere, and palpation of an artery in a case of thromboangiitis obliterans by a previous observer may produce a temporary spasm which may lead to an erroneous impression later. Not infrequently, therefore, there is need for confirmation of digital impressions.

Oscillometry is of considerable value in the quantitative diagnosis of peripheral vascular disease. (Quantitative diagnosis infers the complete elucidation of the exact degree and site of the dis-

ease.) The Pachon apparatus and the Tykos instrument are each suitable, but the latter is of greater value in that it furnishes permanent records and lends itself more readily to examination of smaller and more distal regions. Both instruments are made on similar aneroid principles. Oscillometry, as frequently practised, is entirely useless as a therapeutic index. Its limited value is due to the fact that the chief action of the vasoconstrictor mechanism is on the arterioles and not on the arteries. Pulsations at the ankle are of little, if any significance as a therapeutic index, but pulsations in the foot are of some value. In oscillometric studies in fever produced by intravenous administration of typhoid vaccine, Simpson (*loc cit.*) found that when an artery is capable of pulsation, there is usually a relationship between the temperature of the skin and the amplitude of pulsation. This relationship is much more true of the foot than of the ankle. The presence or absence of pulsation in the foot at the height of fever is, therefore, of some prognostic value as to the effects of ganglionectomy. Simpson concluded that measurement of surface temperature is a far better therapeutic index than oscillometry in that the release of tonus of the arterioles is best detected by surface temperature measurements before and during typhoid vaccine fever. However, surface temperature studies are not of great value for quantitative diagnostic purposes.

Blood-pressure.—With a Tykos recording sphygmomanometer, H. E. Pearce, Jr. and J. J. Morton (*Am. J. M. Sc.* 183:485 (Apr.) 1932) studied the effect of alteration in position of a limb on the blood-pressure of the peripheral vessels of 16 normal subjects. After a period of rest in the horizontal posi-

* Measurements of surface temperatures are made thermoelectrically.

tion, the average pressure in the brachial artery was found to be midway between the pressure in the posterior tibial and the dorsalis pedis, that of the former being consistently higher, and the latter at a lower level.

If the lower extremity was elevated at an angle of 45° the average fall in pressure in the posterior tibial artery was found to be 46 mm Hg. The average height of elevation above the horizontal was 660 mm, and computation of the hydrostatic effect showed a theoretical change of 51.3 mm Hg, which gave a difference from the recorded change of 5.3 mm Hg. The dependency of the limb at an angle of 90° caused an average rise of pressure in the posterior tibial artery of 28 mm Hg. The average amount of depression below the horizontal was 390 mm, which would give a hydrostatic effect of 30.3 mm Hg, a difference of 2.3 mm Hg from the recorded result. The same correlation between the theoretical and actual results of alteration in position was found in the case of the dorsalis pedis artery.

In taking simultaneous readings on the pressure in the brachial and posterior tibial arteries, it was noticed that with elevation of the limb and consequent fall in pressure in the vessels of the extremity there was a slight rise in the pressure of the brachial artery. The converse of this effect occurred with depression of the extremity. In that the instrument used also gives a chart of the strength of the arterial pulsation, it was hoped that pressure could be recorded in the posterior tibial and dorsalis pedis arteries even in the absence of a perceptible pulse. However, no record was obtainable in cases with an absence of perceptible pulsation of the peripheral vessels.

The authors call attention to the fact that in the management of patients with peripheral vascular insufficiency, the effect of position on the circulation should be given consideration. If the circulation is incompetent the limb should never be elevated except during brief intervals for the purpose of exercise. In each individual, depending upon the amount of arterial involvement, ischemia is produced at a definite angle ("the angle of circulatory efficiency"). Depressing the leg slightly would appear to be beneficial through increase of the intravascular pressure, but this should never be done to the extent of causing rubor or cyanosis, since edema may result.

X-ray—In the investigation of the arterial circulation of patients with organic involvement of the vessels, information concerning not only the main channels, but also the smaller arteriolar branches is of importance. It is well known that in some of these disorders, *e.g.*, thromboangitis obliterans, the main arteries are apt to be occluded and the circulation is carried on by the smaller collateral vessels. On the other hand, in peripheral arteriosclerosis, the smaller arterioles may be obliterated, while the larger trunks remain patent. The condition of the *larger arteries* may be determined by palpation for perceptible pulsation, by the application of the Pachon oscillometer or by the use of the recording sphygmomanometer, and occasionally, valuable information is obtained from a plain x-ray in which calcification of the vessels may be demonstrated, but this gives no idea as to the patency of the lumen.

The circulation of the *arterioles and subpapillary network of vessels* may be judged by the appearance of the limb, its temperature, the reaction to elevation or

dependency, by the return of the color after blanching, by the absorption of intradermal saline or histamine, by the Moszkowicz test or other similar tests. For the most part, the methods of physical examination by a competent observer will serve, without the use of special tests, to distinguish between the cases of mild and severe arterial obliteration, however, in many instances, even with the use of all available tests, doubt remains as to the exact extent of the damage. According to H. E. Pease, Jr and S. L. Warren (Ann Surg 94:1094 (Dec) 1931), the direct visualization of the arterial tree with the main trunk, the branches, and the arterioles, is of inestimable value. These investigators report their experience in arteriography with animal experiments and with 7 cases of obliterative arterial disease of the extremities, using sodium-monoiodo-methane sulphonate (methiodol, "skiodan"). In the past, in general, sodium iodide or iodized oils have been the opaque media used in arteriography, but it has been found that these substances possess disadvantages. Sodium iodide has resulted in damage to the vessels, with increase in pain and gangrene, in symptoms of poisoning and in death, and injection of the iodized oils has led to fat embolism with serious consequences and even death. Consequently, a medium was sought which would give sufficient contrast to outline the vessels, without any deleterious local or general effects. No harmful local reaction on the vessel wall was found in their intraarterial injections of methiodol in dogs, nor in their clinical cases of obliterative vascular disease. The drug was dissolved in fresh, glass distilled water, carefully filtered and sterilized by boiling. A 40 per cent solution was found sufficiently radio-

opaque to give good definition of the vessels of the leg (Figs 2 and 3).

The operative method is as follows:

"Without using a tourniquet, the femoral artery is exposed in Hunter's canal, and is separated from the femoral vein and nerve. The cassette containing the film is placed beneath the leg under the drapes and the x-ray tube centered over the area to be studied. The artery is picked up on a tape and compressed between the thumb and finger to prevent admixture of the solution with blood. The vessel wall is punctured obliquely with a new, sharp, No. 20-gauge needle to which is attached a 50-c.c. syringe containing the methiodol solution. Injection is begun and after 25 c.c. of methiodol have been injected, the film is exposed while the solution is still being forced into the artery. The injection is stopped without removing the needle while the film is changed. Then, after injecting an additional 25 c.c., the second exposure is obtained, while the last 5 c.c. are being forced into the artery. After withdrawing the needle, the pressure on the artery is released and a moment's pressure with a sponge stops all bleeding. The elapsed time from the beginning to the end of the injection should be 90 seconds or less. This is a very important part of the technical procedure. There is a remarkable absence of bleeding with the arterial puncture done in this manner. One patient with a systolic blood-pressure of 280 mm. of mercury was operated upon and not more than 3 or 4 drops of blood escaped from the puncture wound."

TREATMENT.— In the treatment of the common arterial diseases of the extremities, it is of the utmost importance to determine the presence or absence of vascular spasm and organic occlusion, and also the relative contribution of each to the circulatory deficiency present. The differential diagnosis of those with mechanical obstruction from those dependent upon vasomotor imbalance is often difficult. As pointed out by W. J. M. Scott and J. J. Morton (Arch. Int. Med. 48:1065 (Dec) 1931), the principle of treatment for purely oc-

clusive disease is the obtaining of a more peripheral distribution of the reduced amount of blood available, while in the spastic type the treatment should be directed toward augmentation of the

dilatation in collateral and nonoccluded arteries, as a most effective method of relieving symptoms and encouraging the healing of abrasions and ulcers in thromboangitis obliterans. The value

Fig 2

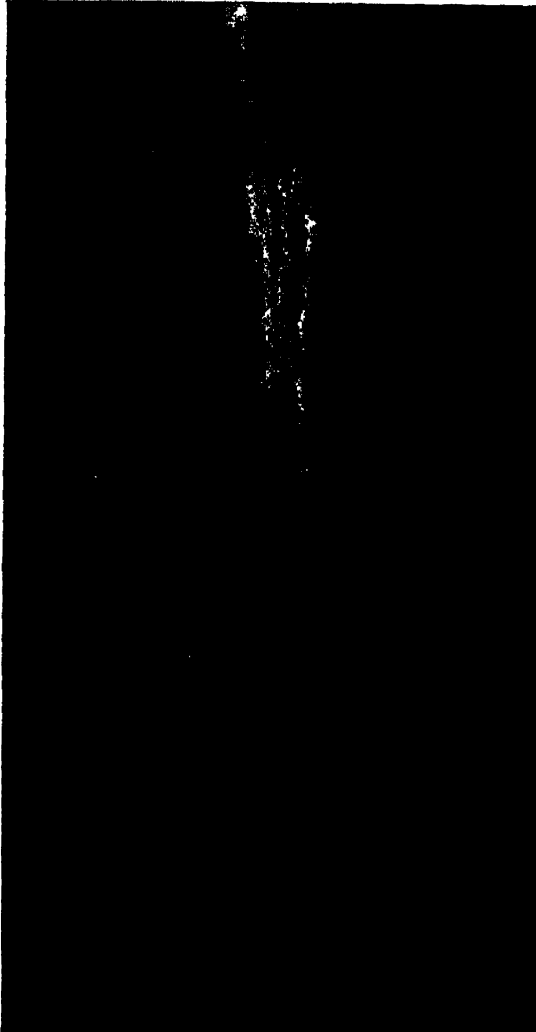


Fig 3



Fig 2—All major arteries have been occluded and circulation is carried on by collateral channels. The arrow points to an anastomotic loop which fills the lower part of the posterior tibial artery

Fig 3—Arterial injection showing patent main vessels in leg. Arrows point to the well-filled dorsalis pedis and posterior tibial arteries

(Pearse and Warren *Annals Surg*)

local circulation by overcoming sympathetic vasoconstrictor spasm

Foreign Protein.—A W Adson and G E Brown (*J A. M. A* 99 529 (Aug 13) 1932) advocate the administration of protein intravenously, for the purpose of producing fever and vaso-

of intravenous injections of typhoid vaccine in determining the available or potential vasodilatation of the extremities in peripheral vascular disease was first pointed out by G E Brown. The surface temperature of different areas of the feet is determined thermoelec-

trically, coincidently with the systemic or oral temperature. The changes in the surface temperature of the foot incident to the protein shock is an index of vasodilatation and increased blood flow.

Vasodilator Drugs.—According to W J M Scott and J J Morton (Arch Int Med 48 1065 (Dec) 1931), it is not possible to obtain an immediate effect with nitrites, acetylcholine, and ergotamine that in any way approaches the effect derived from interruption of the sympathetic fibers.

Vein Ligation in Arteriosclerotic and Diabetic Gangrene.—H E Pearse, Jr (J A M A 98 866 (Mar. 12) 1932) reports his experience with vein ligation in a series of 20 cases of occlusive arterial disease, followed for a year or more, and in 31 other cases recorded in the literature. This procedure was originated by V A von Oppel in 1913. It has been established that if occlusion of a large artery is accompanied by ligation of its companion vein, there results (1) a lower incidence of gangrene, (2) an increase in functional capacity, (3) an increase in intravascular arterial and venous pressure, (4) an increase in the distal circulatory bed, and (5) probably an increase in the functional efficiency of the capillaries, though direct evidence for this is lacking. Vein ligation, however, is but an incident in the treatment of sclerotic arterial disease of the extremities, and must be associated with other measures to secure a good result. Among the latter are the careful preoperative preparation of the patient, the use of spinal or local anesthesia, the treatment of the local lesion and the postoperative care. Cases are divided into 3 groups: (1) those which show a hopelessly damaged circulation, requir-

ing leg amputation, (2) those which result from infection and require only treatment of the local lesion, and (3) those in which there is a fair circulation, with a patent popliteal artery but absent peripheral pulses, and in which conservative treatment, including vein ligation, should be given.

For the *venous obstruction*, either the *femoral* or the *popliteal* vein may be used. The femoral vein is exposed in Scarpa's triangle, doubly ligated, and divided below the great saphenous vein. The popliteal vein is exposed in the lower part of the popliteal space, and is occluded below its junction with the lesser saphenous vein. The femoral vein is easier to expose, and its ligation is probably preferable, especially if the pulse of the popliteal artery is weak. The beneficial effects of vein ligation are the subjective sensation of warmth, the diminution of pain, and the objective changes in the limb, such as accelerated healing of the local lesion, increase in the rate of return of the circulation after blanching, and increase in the temperature of the part. Edema of the extremity rarely occurs.

The results of vein ligation in thromboangiitis obliterans were found disappointing. However, in the group of peripheral vascular disease due to *arteriosclerosis, with or without gangrene*, 60 per cent of 10 suitable cases, with a fair circulation with a pulsating popliteal artery, had a satisfactory result with return of function, while in 40 per cent leg amputation was needed within a year. Nine of the 10 cases had gangrene of the extremity. The impression gained in analysis of the 31 cases reported in the literature is that approximately 50 per cent. of the cases were benefited, while the remainder were unimproved. Pearse's study warrants

the conclusion that vein ligation in appropriate cases definitely increases the efficiency of the circulation of the extremity and helps to avoid leg amputation

Sympathectomy in Thromboangitis Obliterans.—A W Adson and G E Brown (*loc cit*) report the results of a study of 100 consecutive cases of thromboangitis obliterans in which *bilateral sympathectomy* was performed at The Mayo Clinic from 1925 to 1932. The operation has proved to be of greatest value in slowly progressive cases, and in those who cannot afford or are unable to sacrifice the time required to rest in bed and receive local heat, contrast baths and vaccine therapy

Patients were classified as follows

"Slow Progression"—This is the most common type. Coldness of the feet is usually the first symptom, followed by excessive fatigue of single digits, the arch of the foot, the wrist, ankle, calf or forearm. Excessive fatigue gradually changes into and is replaced by the pain of claudication occurring in similar areas, which progresses and produces an increasing degree of disability. Color changes with change in posture are followed by trophic changes which occur spontaneously or are incited by incision of toes, removal of toe-nails, accidental trauma, amputation of toes, or the application of blistering ointments. With the occurrence of trophic changes, the pain is sharply accentuated and becomes almost unbearable. The gangrenous areas increase in extent, necessitating amputation, or healing may occur in a group in which pain can be relieved. The extremities are cold, there is excessive pallor with elevation and abnormal rubor with dependency. As might be expected, pulsation in the arteries is diminished or absent.

The entire process is completed in from 4 to 8 years

"Absence of Progression"—In this type mild symptoms of vascular insufficiency (excessive fatigue or the pain of claudication) progress slowly for a time and then remain stationary. The extremities are cold, the arteries are obliterated, and postural color changes are present. Trophic changes other than proliferation of the nails and increased thickening of the skin over the weight-bearing area do not occur. Disability is minimal in spite of symptoms which may have endured from 8 to 12 years.

"Circulatory Compensation"—This is not a widely recognized type, although it is fairly common. Shallow ulcers do not progress, and after 6 months to a year healing occurs. Gradually, other symptoms largely disappear, leaving the patient with extremities approximately 80 per cent adequate for all needs. With care, patients in this group may go on indefinitely with extremities functioning sufficiently well for all ordinary needs. Weber has noted the return of pulsation in an obliterated radial artery, and this has been observed in several of the writers' cases.

"Acute Fulmination"—In this type the clinical syndrome is the antithesis of slow progression. Claudication appears relatively suddenly and progresses rapidly. The rest pain is severe before gangrenous changes occur and greatly accentuated afterward. Edema and lymphangitis are present around the gangrenous area and there may be slight fever and leukocytosis. The gangrene progresses rapidly, the pain is unbearable and intractable to all measures. Amputation is necessary. The process may be complete after from 3 months to 1 year. This clinical syndrome may occur at any time in the clinical course.

TABLE I

THE INCIDENCE AND RELIEF OF INTERMITTENT CLAUDICATION AND REST PAIN

Thromboangitis Obliterans Treated by Sympathectomy	Operations	With Inter- mittent Claudi- cation	Relieved of Inter- mittent Claudi- cation	With Rest Pain	Relieved of Rest Pain	Continu- ance or Recurrence of Pain
Group 1, uncomplicated						
Disease in upper extremities	4	0		3	2	1
Disease in lower extremities	19	17	16	8	5	1
Group 2, with ulcers						
Disease in upper extremities	1	0		1	1	0
Disease in lower extremities	43	36	33	36	34	7
Group 3, with gangrene						
Disease in upper extremities	10	0		10	10	0
Disease in lower extremities	27	20	12	25	17	8
Total	104	63	61	83	69	25

The average degree of improvement in intermittent claudication and rest pain was 85 per cent

TABLE II

Thromboangitis Obliterans Treated by Sympathectomy	Results				Complications
	Operations	Im- proved	Average Im- provement, Per Cent	Useful Extrem- ity	
Group 1, uncomplicated					
Disease in upper extremities	4	4	81	4	Pneumonia, 1
Disease in lower extremities	19	16	76	16	Incomplete operation, 1. Neuritis, leg amputa- tion. Neuritis, chordotomy, death. Death, 1; pulmonary embolism
Group 2, with ulcers					
Disease in upper extremities	1	1	90	1	Neuritis; chordotomy
Disease in lower extremities	43	39	78	33	Neuritis, 2. Pneumonia, 1.
Group 3, with gangrene					
Disease in upper extremities	10	10	82	9	Incomplete operation, 3.
Disease in lower extremities	27	17	73	13	Pneumonia, 1 Deaths, 5, due to pneumonia, 2; car- diac, 2, anesthetic, 1. Neuritis, 1.
Total	104	87	80	76	

In the absence of trophic lesions, sympathectomy checked progress of disease in opposite extremity in every instance

of cases presenting a previous course outlined in the first and second groups "

The course of treatment is decided upon after completion of the examination, which includes laboratory and vascular studies. Operation is not employed in mild cases without ulcer, nor is it used in cases in which there has been no progression nor in which the circulation has become compensated. In the presence of active cellulitis, hospitalization with medical treatment for from 3 to 6 weeks before operation is indicated. Even in slowly progressive cases, when extensive ulcers or gangrenous digits are present, the authors are inclined to hospitalize the patients for 2 or 3 weeks under vaccine therapy in order to determine how the individual is going to respond to the vasodilating effect obtained by administration of foreign protein before sympathectomy is performed. Bilateral sympathectomy is usually performed even though symptoms are present in only 1 extremity, since (a) ultimately the opposite extremity almost certainly becomes involved, and (b) sympathectomy apparently controls the disease process and preserves the opposite extremity.

The results obtained and the complications incident to operation are shown in Tables I and II. The neuritic symptoms cannot be relieved by either medication or sympathectomy. In several instances, cutaneous nerve branches were divided without relief, and in 2 cases chordotomy was performed with moderate success. The dryness of the skin which follows sympathectomy can be relieved by the application of hydrous wool fat. The narrowing of the palpebral fissure, contracted pupils and enophthalmos of Horner's syndrome, produced by cervicothoracic ganglionec-

tomy, are not conspicuous, nor do they interfere with vision when bilateral

ARTHRITIS.—DEFINITION —

Ralph Pemberton, in a concise résumé, presented before the Clinical Congress of the American College of Surgeons (Surg Gynec Obstet 54 333 (Feb 15—No 2A) 1932) quotes the concept of arthritis, according to the American Committee for the Control of Rheumatism as follows: "The Committee conceives of the disease as a generalized disease with joint manifestations "

CLASSIFICATION.—This Committee recognizes 2 types of arthritis: (1) atrophic and (2) hypertrophic

Another classification, in the already confusing array, was suggested by M. Smith (New England J Med 206 103 (Jan 21), 160 (Jan 28), 211 (Feb 4) 1932). From a study of literature on arthritis, he concludes that there does not seem to be any universal classification of the arthropathies, nearly every author using slightly different nomenclature, and would suggest the following

- A PRIMARY INFLAMMATORY ARTHROPATHIES
 - 1 Septic arthritis (purulent arthritis)
 - 2 Nonseptic arthritis (allergic arthritis)
 - (a) Serum disease
 - (b) Acute rheumatic fever without demonstrable cardiac involvement (so-called "acute infectious arthritis")
 - (c) Acute rheumatic fever with cardiac involvement (so-called true "rheumatic fever")
 - 3 Acute gout
- B DEGENERATIVE ARTHROPATHIES
 - 1 Atrophic arthritis
 - (a) Nonspecific (so-called "chronic infectious arthritis," "proliferative arthritis," "arthritis deformans," "chronic progressive deforming polyarthritis," "rheumatoid arthritis")
 - (b) Luetic (Charcot's joint)
 - (c) Syringomyelia arthropathy
 - (d) Lead poisoning arthropathy

- 2 Hypertrophic arthritis (osteoarthritis), also called "arthritis deformans"
 - (a) Uncomplicated
 - (b) Associated with
 - 1 Atrophic arthritis
 - 2 Chronic gout
 - 3 Syringomyelia
 - (c) Tuberculous arthritis
 - (d) Traumatic arthritis.

In the discussion Miller points out that most of the confusion of ideas has centered around the so-called "atrophic arthritis," and he offers evidence that there is such an entity and would suggest the following descriptive classification.

ATROPHIC ARTHRITIS

- 1 Prodromal
- 2 Chronic polyarticular
 - (a) With periarticular swelling
 - (b) Without periarticular swelling
- 3 Subacute polyarticular.
 - (a) With periarticular swelling
 - (b) Without periarticular swelling.
- 4 Acute destructive
 - (a) Polyarticular
 - (b) Nonarticular
- 5 So-called "muscular rheumatism"

M. Wetherby and B. J. Clawson (Arch Int Med 49:303 (Feb) 1932) also refer to the lack of universal agreement on nomenclature and give as an example the difference between the American and British terms in describing the same conditions:

<i>American</i>	<i>British</i>
I Rheumatic fever	I. Rheumatic fever.
II. Proliferative Infectious (x-ray). Atrophic	II Rheumatoid.
III Degenerative. Hypertrophic (x-ray)	III Osteoarthritis

[NOTE: Inspection of the above classifications indicates that there is no generally accepted method of classifying this "disease syndrome" on any one etiological, pathological or clinical basis.]

ETIOLOGY.—Wetherby and Clawson (*Ibid*) continue their discussion by

stating that there also exists "a decided lack of agreement in opinion concerning the etiology of chronic arthritis." These writers (Ann Int Med 5:1447 (June) 1932) consider that chronic arthritis is due to a streptococcal infection, because these microorganisms have been recovered from the blood, joints, lymph nodes, and subcutaneous nodules from a relatively high percentage of the cases of chronic arthritis. A high percentage of patients with chronic arthritis are found by the skin test to be hypersensitive or allergic to streptococci. The streptococcal agglutination titer is higher in patients with chronic arthritis than in normal individuals. The cellular reactions in the lesions in chronic arthritis are similar to those of known origin, such as acute rheumatic fever and subacute bacterial endocarditis.

Many observers have tried to conclusively prove that the main etiological factor is infection. H. Bernhardt and P. S. Hench (J. Infect Dis., 49:489 (Dec.) 1931), in an endeavor to confirm the findings of R. L. Cecil, E. E. Nicholls and W. J. Stainsby (Am J M. Sc. 181:12 (Jan) 1931), were unable to isolate the streptococci from a single case in the series of 20 cases, but they did obtain 4 growths of staphylococci and 1 growth of a diphtheroid organism. They do not consider their results as evidence for or against the infectious etiology, pointing out, however, that present cultural methods are not as satisfactory as they should be, to study this important phase of the subject.

L. C. Hadjopoulos and Reginald Burbank (J. Bone and Joint Surg. 14:471 (July) 1932) have found it possible to produce in rabbits pathological lesions exactly comparable to those found in chronic atrophic arthritis in the human

being The streptococci were first isolated from the blood stream of an afebrile arthritic patient. Most of the morbid anatomy and the concomitant symptoms were traced directly or indirectly to changes in capillary circulation, a finding which Pemberton has long contended is due to some toxic degeneration.

By incubating the entire joint of the rabbit, they were able to demonstrate the infecting organisms in practically all the lesions associated with a chronic atrophic arthritis. Streptococci were found disseminated in the synovial membrane of the adjacent bone, bone-marrow, cartilage, tendons and muscles.

The organisms could even be demonstrated in the liver, emphasizing significantly the fact that chronic atrophic arthritis is fundamentally a chronic systemic disease.

Wetherby and Clawson state that their findings agree with those of Cecil, Nicholls and Stainsby, while M. H. Dawson, Miriam Olmstead and R. H. Boots (Arch Int Med 49:173 (Feb) 1932), using the same technic as Cecil, Nicholls, and Stainsby, could not verify their findings.

Many observers, according to A. Brunschwig and A. Jung (Rev de Chir, Paris 50:521 (Sept) 1931) hold that, not the organism *per se* but the *exotoxin* or *filtrates* of the cultures of the organism are responsible for the development of chronic arthritis.

Another factor considered in the etiology is *occupation*. M. Smith (*loc cit.*) in analyzing his study of 102 patients, points out, however, that the incidence is as great in students as in laborers, machinists and farmers, and as frequent among clerks as among merchants.

In the consideration of *sex*, Smith

found that females in middle life were more affected than males of the same age group, suggesting a menopausal effect not found in the male. Other age sex groups seem to be affected equally [Robert Shoemaker, III, Roentgenologist to the Lankenau Hospital, Philadelphia, in a personal communication to the writer states that the incidence of arthritis accompanying artificial menopause due to pelvic radiation approaches 80 per cent—Ed.]

In reviewing the data on *basal metabolism* in his series, Smith concludes that some cases present features of both increased and decreased thyroid functions; this function, being determined on a basal metabolic rate basis, however, pointed to no particular dysfunction of the thyroid. Other writers do not agree with this.

Allergy as an etiologic factor is not considered by Smith as the main factor in chronic arthritis.

Diet as an etiologic factor, according to B. L. Wyatt (M. J. and Rec 133:369 (Apr 15) 1931), is important, not only in quality, but in quantity, and he infers that the "metabolic" and the "mechanical" loads should be reduced. He also infers that there is a lack of vitamins F and G, which should be restored in adequate amounts.

R. Pemberton and E. G. Pierce (Ann Int Med 5:1221 (Apr) 1932) have discussed the passage and passengers of the intestinal tract and show that whether it is cause or effect—overloading the gastric apparatus with too much food or improper food causes, in many cases, exacerbation of the symptoms of arthritis.

Body habitus as the main factor in the etiology of arthritis has been pointed out by many writers and may be considered along with *constitutional factors*.

There seems to be much more attention directed to the evaluation of the various body configurations, and the occurrence of the atrophic form of arthritis in the asthenic type of body and of the hypertrophic form in the sthenic type of body is so frequent as to take it out of the category of accident. Attention is also called to the fact that the intermediate type of body configuration is not immune to arthritis, which would place the constitutional factor as one, but not the main, cause of arthritis in all cases.

Certain diseases, *i.e.*, tuberculosis, osteomyelitis, syphilis and gonorrhea, are productive of their types of arthritis, which should be considered in making a differential diagnosis.

Under miscellaneous etiologic factors may be mentioned poisoning by heavy metals (radium ingestion), psychic factors and trauma.

Sympathetic nervous system involvement is probably closely connected with constitutional factors, and will be referred to under Symptoms.

Pemberton, in the previously mentioned paper quotes the opinion of the American Committee, which he endorses, "that at the present time no single infectious agent or completely defined dietary deficiency or metabolic disorder has been shown to be the sole cause of these disorders. The Committee inclines to the belief that any one of these factors, or certain combinations of these factors, under appropriate circumstances, may basically underlie the onset of the disease."

PATHOLOGY.—The pathology which has attracted most attention has been that of the joints. There has been very little added to the literature during the past year which indicates any great strides forward in the general knowledge of the joint pathology of this dis-

ease. It might be pertinent to state that there is incomplete experimental evidence that overgrowth of bone, resembling the picture frequently seen in arthritis, has been caused by the ligation of the patellar blood supply in animals.

More attention is being paid to the *dynamic pathology* which has been productive of some interesting conclusions. A *low sugar tolerance* which, when studied by Pemberton, proved to be not diabetic, in fact, but dependent upon the blood flow to the periphery, and could be affected by position of an extremity tending to accelerate or retard the blood flow. This low sugar tolerance could also be affected by vasodilator drugs and heat, but the most effectual factor in its control was diet—a diet low in carbohydrates which was productive of one of the most successful measures available in the control of this disease. The *atonic bowel* has been thoroughly studied by Pemberton, thus adding to the armamentarium of the internist not only a weapon (irrigation, etc.) with which to fight the disease, but an indicator as to the course of the battle. (Return of normal x-ray shadow indicating remission in activity.)

In his conclusions following a study of 102 cases, Smith (*loc. cit.*) states under *constitutional defects*, that arthritis has strong familial tendencies. The strong familial disposition to the allergic state is well known. Allergic manifestations are evidences of a peculiar reactivity on the part of the autonomic nervous system, the vascular system and the smooth muscle system. It is these very systems that appear to be involved, as a study of the prodromal symptoms and signs, and the constitutional symptoms and signs after the disease has become arthritic, will reveal. This, according to Smith, is just the be-

ginning of the study of atrophic arthritis, but it is a fair and logical beginning. He considers that it should be thought of as a vascular disease, or neurovascular disease, and certainly not as "infectious arthritis."

Concomitant Pathology.—In the light of Smith's conclusion, it is obvious that there will be evidence of involvement of other tissues and systems in the economy, and most careful observers now agree with the statement of Ralph Pemberton ("Arthritis and Rheumatoid Conditions, Their Nature and Treatment," p 336, Lea and Febiger, 1930) that "arthritis touches more fields of medicine than does any other disease, and deserves to be ranked as one of its major chapters, together with tuberculosis and syphilis."

Subcutaneous Nodules — These are frequently seen in conjunction with arthritis, but M H Dawson, Miriam Olmstead and R H Boots (Arch Int Med 49 173 (Feb) 1932), in reporting studies of these nodules, found that no sections of the subcutaneous nodules stained with Gram's method showed characteristic microorganisms. In the study of blood cultures, and aerobic and anerobic cultures on synovial fluid, no organism was found which could be considered of etiologic significance.

M Smith (*loc cit*) reported that *asthma, hay-fever and urticaria* occurred in a number of his cases. These conditions were found with sufficient frequency to suggest this as an important line for investigation.

Smith, as well as other observers, point out the occurrence of *eczema* and *psoriasis* in arthritic subjects, the course of the diseases appearing to follow that of the accompanying arthritis. Smith also points out the occurrence of *myositis* and *neuritis*, the last two diseases

being properly thought by most clinicians to be part of the arthritic picture.

Specific Joint Pathology.—The early joint of atrophic arthritis, arthritis deformans, proliferative arthritis, infectious arthritis, rheumatoid arthritis, etc., is the seat of a *proliferation* of the synovial membrane (from whence comes the name), according to Ralph Pemberton ("Arthritis and Rheumatoid Conditions, Their Nature and Treatment," Lea and Febiger, 1930). From this synovial membrane there grows inward over the faces of the articular cartilages and involving the perichondrium, a pannus of vascular connective tissue.

The marrow spaces in the epiphyses are also the seat of an inflammatory process which manifests itself by proliferation of the connective tissue in the marrow spaces and of the endosteum lining the marrow spaces and forming new trabeculae.

Cartilage is destroyed by the inflammatory processes, above and below. Treatment in this type of arthritis must obviously include some degree of active motion of the joint, so as not to permit the formation of ankylosis by the inflammatory adhesions which are followed by fusion and ingrowth of the inflammatory vascular tissue from the face of one bone to the face of the other, the end-result being the laying down of bone, forming a *continuous* marrow cavity no longer divided by a joint space.

The process in hypertrophic arthritis, osteoarthritis, degenerative arthritis, etc., is, as the last term suggests, a degenerative involvement of the articular cartilage. At first, there is fibrillation of the articular cartilage in the direction of the long axis of the bone, followed by softening and erosion of the cartilage which exposes the underlying

bone This process does not take place in all parts of the cartilage equally, thereby giving an uneven contour to the ends of the opposing bone surfaces. The process is, in a manner, compensatory, in that the ridges on one surface articulate with the hollows in the other surface, usually permitting a fair degree of motion in the joint. When limitation of motion is seen in a joint of this type, it is due to the mechanical impingement of one uneven surface against the other. Ankylosis is never seen in this type of joint. Occasionally, the degeneration of the cartilage is complete, the bones articulate without the protection of cartilage and the end-picture, eburnation of the bony articular surfaces, results. There is also activity below the articulating surfaces, but it takes the form of thickening of the bony trabeculae which encroaches upon and at times almost obliterates the marrow spaces. It is in this type of arthritis that rest may be indulged in more freely.

SYMPTOMATOLOGY.—Referring again to Pemberton (Surg. Gynec. Obst. 54:333 (Feb. 15-No. 2 A) 1932), who quotes the conception of The Committee on the Control of Rheumatism regarding symptoms, this writer states that certain prodromes may be recognized and it is of vital importance that they be recognized.

As mentioned under pathology, the habitus and constitutional defects seem to be of utmost importance. An individual who can apparently inherit the color of his eyes and hair, his stature and other familiar characteristics, can be reasonably expected to inherit a familial type of body chemistry and physiology. He may not inherit the disease *per se*, and he may never show evidences of the active disease, but he is so constituted that, given the

proper set of circumstances, the disease is started, therefore symptomatology starts, not in the patient, but in a patient's family and, as is pointed out by many observers of arthritis, a history of family incidence is sometimes surprising, Pemberton's figure on 142 cases being 58 per cent. In Smith's series the incidence was 37.5 per cent, the family history in the males being higher, approaching that of Pemberton and Pierce.

The patient may complain of having been hurt and examination will show a well developed arthritis which has been present for an indefinite period, but it required the trauma to bring the arthritis to light. This same picture may follow an acute illness or profound emotional strain. An interesting observation has been made that the prodromal symptoms seem to be more constant, intense, and lasting over longer periods of time in the atrophic type than in the hypertrophic form of arthritis. In some of the asthenic individuals, the prodromal symptoms appear to have been present from birth (which is probably not far from the truth).

The most usual signs and symptoms may be listed according to Millard Smith, who quotes Jones as follows:

Vasomotor.

Ischemic crises.

Cold, moist, cyanotic extremities.

Muscular.

Cramps.

Weakness.

Wasting.

Sensory.

Numbness of extremities.

Tingling of extremities.

Bone soreness.

Neuralgic pains.

Muscle pains.

Hyperesthesia of skin and muscles.

Neurologic.

Increased tendon reflexes.

Additional signs and symptoms not mentioned by Jones

Vasomotor and Autonomic

Flatulence
Constipation
General pallor
Palpitation.
Indigestion
Excessive perspiration.
Headaches
Intermittent exophthalmos
Intermittent swelling of thyroid

Muscular

Twitching
Stiffness

Sensory

Sensitive to cold

Neurologic

Frequency (urinary)

Subjective

Fatigue
Nervousness
General weakness
General debility
Nervous breakdown.

Objective

Loss of weight
Ecchymoses
Scleroderma.

To these may be added the picture of swollen, painful joints, crippling deformities, painful or not, flat-feet, internal pronation of feet, backache, nausea, anorexia, disturbances in vision, tinnitus, disturbances in hearing and vertigo. The laboratory will detect increased oxygen saturation of peripheral blood, and disturbance of capillary circulation in extremities may be detected by the thermocouple, as reported by Pemberton.

The term "arthritis" brings before the average person a picture of a partially or completely crippled individual, ready for the orthopedic surgeon or for anyone onto whom this being may be passed, but increased interest in this subject will probably change this attitude because, like Pemberton, many

think much can be done to alleviate the hopelessness with which this disease has been, up to the present, mistreated.

TREATMENT.—It is obvious that after reading the foregoing statements from various sources, that the treatment of arthritis is determined almost entirely by the type of arthritis under consideration.

The first consideration, however, is rest, in order to combat the usual complaint of fatigability on little exertion, but in using this valuable factor, the type of arthritis must be kept in mind. In the atrophic form physiological rest with mild active or passive motion of the stiff joints is advised. If, however, ankylosis seems inevitable, the joint should be permitted to assume a position which is accepted as least harmful to the function of the body as a whole.

Such extreme care is not so important in the hypertrophic form of the disease.

Diet is probably the next factor in importance in the treatment of arthritis, and by some may be thought to be of greater importance than rest.

Pemberton and Pierce (*loc cit*), in their discussion of the intestinal tract and diet, observed many cases in which an x-ray of the gastrointestinal tract disclosed the most bizarre configurations of the colon. Others have observed the same phenomena, and on this basis *high colonic irrigations* became the vogue. The above writers do not believe that this procedure is warranted as frequently as other measures, and they further suggest that the material which is washed out is, in the majority of cases, exactly that which is taken by mouth. They further point out that Rowlands and other observers have produced this tortuosity and enlargement of the colon by feeding experimental animals diets

high in carbohydrates and low in protein and vitamins. Pemberton and Pierce, therefore, conclude that a case of arthritis properly selected may be greatly benefited by the use of a *diet low in carbohydrates, high in vitamin content* and getting the bulk of its calories from the protein and fat content.

The diet which seems to have given the best results in the hands of these writers in the treatment of both types of arthritis is one which is inaugurated by withholding solid food for the first 2 days, allowing only juice of 1 orange 3 times daily and water *ad libitum*. The third day a cup of coffee containing 2 drams (8 Gm.) of sugar is added, as well as 8 ounces (240 c.c.) of strained vegetable soup. The soup in some cases is not added until the fourth day, when 2 Uneda crackers are also permitted, in some cases the Uneda biscuits are not added until the fifth day. From the sixth to the eighth day, semiliquid diet is permitted (1000 to 1100 calories), gradually built up to approximately 1465 calories, which is maintained for periods varying from 15 days to 2 or more months. A sample diet containing the caloric ratio of the 3 food substances follows:

	Calories, Protein	Calories, Fat.	Calories, Carbohydrate
Breakfast	75 0	262 1	194 0
Dinner	41 2	253 6	114 0
Supper	157 3	184 9	178 4

The daily caloric intake being protein 273, fat 701, carbohydrates 486, making a total of 1465 calories. The vitamin content was adequately maintained.

G. Kahlmeter (Proc. Roy. Soc. Med. 25.1117 (May) 1932), in discussing modern physiotherapeutic measures in the treatment of arthritis, emphasizes the use of the x-rays. He considers

massage to be helpful in getting rid of exudates, and that active and passive movements are important even in acute cases of arthritis. He also believes that baths are beneficial, particularly in that the limbs are supported by the water in their movements. He does not consider diathermy of value except in osteoarthritis, frequently increasing instead of diminishing the pain.

Kahlmeter, however, has found fractional courses of x-ray irradiation beneficial in all forms of arthritis. He suggests $\frac{1}{6}$ of a skin erythema dose at 2 or 3 day intervals until 50 per cent of an erythema dose has been given, the strength of the dose and filter being determined by the depth and size of the joint. The results are immediate, the procedure simple, speedy and inexpensive. He reports good results in 60 per cent of 180 cases of rheumatoid arthritis, 90 per cent. of 15 cases of gonorrheal arthritis, and 60 per cent. in 10 cases of gout. The results were less satisfactory in osteoarthritis and spondylosis rhizomelia, the former being benefited 40 per cent. in 41 cases, while in the latter no improvement was noted in 6 cases. Lumbago was benefited in 60 per cent. of 65 cases, and the same percentage was obtained in cases of sciatica. Brachial neuralgia was helped in 80 per cent. of 54 cases.

In considering various remedial measures which have proved more or less effective in rheumatoid affections, Dezsö Deutsch (Med. Klin. 27:1491 (Oct. 9) 1931) concluded that their therapeutic actions were based on the production of hyperemia in the skin, muscle, or both. On the theory propounded by Lewis and others that the *modus operandi* of the production of hyperemia was local liberation of histamine in the tissue where mechanical, thermal or other stimula-

tion was applied, Deutsch sought to employ histamine directly. Intramuscular and subcutaneous injections were associated with such unpleasant histamine reaction, however, that another method of administration was used, *i. e.*, cataphoresis.

Control observations disclosed no beneficial effects from electricity *per se*.

The result of this method of treatment was reported by Deutsch in 250 cases as "immediate relief of pain and muscle spasm in the majority of cases."

The best results were obtained in myalgia, arthritis deformans, chronic polyarthritis and pseudosciatica. True sciatica does not respond.

Pain due to periostitis is only temporarily relieved in about one-half of the cases. Relief was rapid and effective in cases in which other therapeutic measures had failed.

B. J. Clawson and M. Wetherby (Ann Int Med 5:1447 (June) 1932) endeavored to treat patients with chronic arthritis by vaccination. Animal experiments were performed for the purpose of developing an efficient method of vaccination which would give the highest degree of immunity against streptococci.

These writers point out that the things necessary in a vaccine for chronic arthritis are (1) not to make the patient hypersensitive to the protein in the vaccine, (2) to desensitize the patients who are already hypersensitive, and (3) to bring about a high degree of protective immunity.

Three hundred and one cases of chronic arthritis received 5 or more intravenous injections at weekly intervals. The organism used in the vaccine was from a case of acute rheumatic fever and had been cultured for 9 years. It was of low virulence, did not agglutinate

spontaneously, and was safe for intravenous injections. Cross agglutination occurred in high dilutions (1:50,000) with many other strains of both acute rheumatic and chronic arthritic origins.

Dosage—The first dose was 100 million organisms, which was increased at weekly intervals by 100 million more. As a rule, not more than 8 to 10 injections were given.

Reactions—Slight reactions with temperature and chills occurred in about 50 per cent of the cases. The degree of reaction seemed to have no relation to clinical improvement.

Number of Injections—Nearly two-thirds of the patients experiencing improvement showed this after 5 injections, and in nine-tenths it was observed after 7 injections. There were very few cases in which improvement took place if it had not occurred with 8 to 10 injections.

Agglutination Titers and Vaccine Therapy—The majority of untreated cases showed an agglutination titer of 1:200 with the strain of streptococcus used in the vaccine. The intravenous vaccine therapy stimulated a definite rise in the agglutination titers in the serums of most of the patients. Clinical improvement appeared most frequently when the titer was 1:6400 or over. The height of the streptococcic agglutination titer seemed to be a reliable indicator in most instances of the protection possessed by the patient against streptococci.

Results—Determination of clinical improvement was based on 3 points: (1) decrease in pain, (2) decrease in joint swelling, and (3) increase in joint movement. There was definite clinical improvement in 80 per cent. of the cases treated.

The use of intravenous injections of *Bacillus typhosus* in treating chronic arthritis is contraindicated, because such injections do not desensitize patients hypersensitive to streptococci, and do not cause the development of a protective immunity in the patient against streptococci.

Clawson and Wetherby (*Ibid*) conclude, that intravenous streptococcic vaccination seems to meet the demand of a method of vaccination for chronic arthritis in not increasing hypersensitiveness, in desensitizing the already hypersensitive individual and in producing a high protective immunity against streptococci.

Since the subcutaneous method appears to increase hypersensitiveness, does not bring about a state of desensitization, and produces only a low degree of protection, it is contraindicated.

Cases of rheumatoid arthritis which have failed to respond to other measures have been treated by W. S. C. Copeman (*Brit. M. J.* 2 1130 (Dec 19) 1931) by transfusions to increase the blood resistance and insulin to combat the delayed blood glucose curve without glycosuria. He advocates the use of an immuno-transfusion in which the donor is immunized with a vaccine prior to giving his blood. This method, however, is troublesome. Ordinary large transfusions may be employed by placing the patient in bed during the treatment which consists of 2 transfusions at intervals of 8 days, with intensive physical treatment after each transfusion. The patient is gotten up on the ninth day before the psychological effect of the procedure has been dissipated. The insulin treatment is then initiated by 2 injections daily of 5 units, 15 minutes before luncheon and dinner. The next

day 2 injections of 10 units are given at the same time. The third day, provided there has been no reaction, a dose of 30 units is given, which is continued daily for about 3 weeks. No special diet is ordered, but 1 pound (384 Gm) of glucose is added to the diet in 24 hours, some of which is to be taken before retiring.

In reporting the above treatment, Copeman states that no harm and in most cases considerable benefit results [Contrast the latter part of this treatment with ideas propounded by Pemberton and Pierce—*Id*].

According to the nomenclature worked out by the special commission on rheumatism that met recently at Moscow, as reported by I. A. Snegurskiy (*Sovet. vrach gaz.* p 479 (Apr. 30) 1932), rheumatic disease disturbances may be placed in 1 of 2 groups. (1) the acute group, (2) group including chronic latent diseases with variable etiology and pathogenesis and an uncertain nature. In this second group the following treatment seems to be indicated. Freshly prepared 10 per cent. solutions of sodium iodide, sterilized before use by heat. Beginning with 10 c.c. (2½ drams), to determine any reaction, the same concentration of sodium iodide was injected intravenously; subsequent doses were 20 c.c. (5 drams). Injections were given at intervals of 1, 2 or 3 days, the average number of injections being 10 to 15. Of the 47 patients treated, 30 were benefited, while in 9 no improvement was observed. He also advocates the use of other measures, especially physical therapy.

According to M. S. Henderson and A. W. Adson (*J. Bone and Joint Surg.* 14:47 (Jan.) 1932), caution should be exercised in selecting cases for sympathetic ganglionectomy and trunk re-

section, the greatest relief being afforded where vasospastic phenomena, such as cold, wet, pale or cyanotic extremities, are seen in young persons whose arteries are patent, elastic and not occluded

The operation is not indicated in advanced cases where there is advanced ankylosis nor where active infection is present. Good results are observed in cases where the smaller joints are involved, as the fingers, hands, wrists, toes, feet and ankles, but where there is involvement of the larger joints, as the knees, hips, shoulders and spinal column, little is accomplished either in checking the disease or ameliorating the symptoms

Ralph Pemberton (Surg Gynec Obst 54 333 (Feb 15—No 2 A) 1932) states "no drugs deserve to be stressed as a solution to this problem [arthritis]. If any are to be mentioned let them be arsenic, for its influence upon secondary anemia so commonly encountered, and the salicylates, to meet emergencies only. The treatment of cough in tuberculosis rests upon a balanced physiological program and not upon opiates. By the same token, the treatment of pain in arthritis should depend upon correction of the faulty physiology, local and systemic, and not upon the use of analgesics."

ASBESTOSIS.—Of the 2 cases of pulmonary asbestosis reported by H L Stewart, C J Bucher and E H Coleman (Arch Path 12 909 (Dec) 1931), the symptoms in the first were relatively unimportant. In the second case the disease was concomitant with tuberculosis and, with it, was the cause of death. The similarity between some of the features of tuberculosis in childhood and tuberculosis complicated by

asbestosis is suggested. In asbestosis the lung is not the only organ invaded, the spleen and lymph nodes may also harbor large asbestosis bodies. From the histories of the cases reported there appears to be a further need for study along the lines of prevention of this disease

From the presence of the asbestosis body in the sputum, S R Gloyne (Lancet 1 1351 (June 25) 1932) has made the following deductions: (1) since these typical bodies have not been found in any other disease, their presence is an indication of exposure to asbestos dust. (2) The fact that the bodies have not been found in asbestos dust implies that their formation is the result of some tissue reaction in the body—probably a colloidal reaction in which the iron plays a part. (3) The presence of asbestosis bodies in the sputum means that asbestos fibers have been present in the lung for many weeks at least. (4) The presence of the asbestosis body implies a tissue reaction to the fiber, but it does not necessarily follow that this reaction is accompanied by fibrosis. On one occasion 5 connective tissue fibers were found in sections of a guinea-pig as early as 12 days after subcutaneous inoculation of asbestos fibers, but the amount was minute. A heavy dose of fibers would be needed—and even then years might elapse—before the fibrosis was sufficient to be detected by physical signs or x-ray examination or to produce dyspnea. It would be unsafe, therefore, to accept the presence of the asbestosis body as undeniable evidence of fibrosis, all that can be said at present is that the asbestosis body is an expression of tissue reaction of the nature of a benign irritant, and that fibrosis may be a part of that tissue reaction

ASTHENIA, NEUROCIRCULATORY.—This condition is a pathological state in which there is an excessive stimulation of the adenal-sympathetic system. G. W. Crile (Surg Gynec Obst 54 295 (Feb 15—No 2 A) 1932) concluded that the hyperactivity of the adrenal could be reduced by bilateral denervation of the adrenal glands, the two denervations being separated by an interval of a week or more. The picture produced by this condition is one of abnormal nervous excitation, abnormal palpitation of the heart, abnormal nervous fatigue and excluded diseases such as psychoneurosis, psychosis, neuroses, hysteria, maladjustments, in short all mental and psychic diseases. The theoretical and the practical indications for denervation of the adrenal glands are found in those individuals whose mental and psychic mechanism falls within normal range, but whose sympathetic system is under an otherwise uncontrollable stimulation analogous to that present in hyperthyroidism and in Raynaud's disease.

DIAGNOSIS.—The first point in the diagnosis is to make certain that the mental and psychic mechanism is normal. Then, if an unstable heart is found, as manifested by tachycardia induced by trivial causes, or by no apparent cause such as by changing posture, turning over in bed, standing up, slowing of the heart rate when the patient bends over, any alterations in the heart beat up to and including paroxysmal tachycardia; or if the pupils dilate as the result of pressure in the region of the epigastrium, if hippus, tremors, sweating and cold hands and feet are present, if there are unaccountable nervousness and tremors; if there are intermittent nervous excitation and fatigue; if infections and heart lesions are ex-

cluded, then the diagnosis of neurocirculatory asthenia may safely be made.

TREATMENT.—*Technic of Adrenal Denervation.*—Except in cases of high blood-pressure, **spinal anesthesia** is the method of choice for denervation of the adrenal glands, since it produces complete relaxation and lessens bleeding. The alternative to spinal anesthesia is local and regional block anesthesia, combined with analgesia or with nitrous oxide or ethylene. If the operation is being performed under local and regional anesthesia, then the adrenal glands, themselves, are blocked with **novocaine**, since, although they lie among tissues which are only slightly sensitive to pain, they themselves are sensitive.

Recently, Crile has employed a *modified kidney incision*. This incision, running from behind forward, terminates at about the middle of the twelfth rib, and is then carried downward vertically. The incision must be large enough to admit the hand into the renal space. Every bleeding point must be securely tied before the deeper dissection is begun. After the renal fascia has been adequately incised, a long vessel may be seen in the renal fat which marks the trail to the adrenal gland. The first step is to mobilize the upper pole of the kidney and to depress the entire kidney, when usually the yellow, curved edge of the adrenal may be seen. If the adrenal is not seen, the hand is introduced, and by palpation toward the vertebral column and the great abdominal vessels, the external earlike border of the gland will be felt. At this point special instruments are introduced, *viz.*, long, slender dissectors, at one end of which is a dull dissecting blade and at the other end a blunt hook. In addition, Crile uses a pair of blunt nerve hooks on a long shaft, a pair of French intestinal forceps, a tonsil dissecting knife, and a pair of curved tonsil scissors.

After the gland has been exposed by separating the fat, the blood-vessels are identified, and, then, by means of the blunt nerve hooks, tonsil scissors and a long-handled tonsil knife, the nerves are divided. When this procedure has been completed, the adrenal gland is quite mobile. It can then be raised vertically from the vertebral column for a considerable distance. Owing to the loose retroperitoneal tissue and the danger of oozing, 2 cigarette drains are usually inserted,

in the lumen of which iodoform gauze has been placed

Immediate Operative Results.—In 126 cases, there have been no deaths from anesthesia, pneumonia, shock or hemorrhage. There have been two physiological deaths.

The day following the first denervation the patient will notice a lessening of consciousness of his heart, he will experience a diminution of the feeling of nervous tension, he will observe a lessening of the cold sweat, a warming of the skin, and the patient will become less restless. If the first denervation produces none of these beneficial results, it will be because the diagnosis is incorrect and the second denervation need not be performed. In correctly diagnosed cases, the second denervation will be followed by further improvement along the same lines.

End-results.—One patient has remained well for 14 years after unilateral adrenalectomy, 1 for 4½ years after unilateral denervation; and of the 21 cases of bilateral denervation performed within the past 18 months, 18 patients have remained well to date. In 2 cases the results were negative, and 1 patient could not be traced. The final decision as to the potency of adrenal denervation must await the test of time.

ASTHENOPIA.—SYMPTOMS.

—E. Clarke (Practitioner 128 465 (May) 1932) points out that eyestrain may be responsible for many general ailments such as migraine, dyspepsia, insomnia, general lassitude or malaise. Uncorrected errors of refraction (or astigmatic errors) and anisometropia are a constant drain on nervous energy. In the young and strong, this can be well tolerated without harmful effect, but in the less robust individuals this drain

produces many symptoms by reflex irritation and results in loss of resistance and vitality.

ATELECTASIS.—PATHOGENESIS.—Theories of the origin of atelectasis fall roughly into 4 groups, according to D. Band and I. S. Hall (Brit J Surg 19 387 (Jan) 1932): (1) those which postulate an active process in the lung, probably of reflex nervous origin, (2) those in which posture is considered the most important factor; (3) those in which the essential factor is believed to be the absorption of air below an obstruction such as would be formed by a plug of mucus, and (4) those attributing the condition to diaphragmatic paralysis.

Investigations were carried out on dogs. The animals were divided into 9 groups, in each of which a different procedure was followed. In all of the groups the respiratory tract was studied with the bronchoscope and the x-ray and occasionally by postmortem examination. Narcosis was induced by the subcutaneous injection of sodium amytal and morphine in such a dosage that the cough reflex was abolished and the dogs regained consciousness completely within 3 or 3½ hours after the injection. The 9 procedures used were as follows:

- 1 Simple laparotomy
- 2 Bronchoscopy and bacteriological examination of the bronchi of normal dogs
- 3 Bronchoscopy and the introduction into the right bronchus of gum acacia of varying degrees of viscosity
- 4 The bronchoscopic introduction of a solid foreign body into the lumen of the right bronchus
- 5 Laparotomy combined with the bronchoscopic introduction of gum acacia into the lumen of the right bronchus
- 6 The bronchoscopic introduction of gum acacia of low viscosity followed by strapping of the chest

7 The introduction of gum acacia of a viscosity similar to that of the bronchial content obtained from a patient suffering from massive collapse, followed by the application of adhesive strapping to the lower ribs

8 Exposure of the right phrenic nerve in the neck, a study of the effect of electrical stimulation, and avulsion of the nerve

9 The bronchoscopic introduction of gum acacia into a previously phrenectomized animal

In the experiments in which the fourth procedure was used the foreign body was promptly coughed up when the animal regained consciousness. In those in which the third, fifth, and sixth procedures were used, areas of lobular collapse were found in the lung. In those in which the seventh and ninth procedures were employed characteristic massive collapse of the lung was produced.

Therefore, 3 factors acting in combination were necessary for the experimental production of massive collapse of the lung: (1) an intrabronchial content of definite viscosity, (2) abolition of the cough reflex, and (3) limitation of respiratory movement. The intrabronchial content of definite viscosity was provided by the gum acacia solution. The cough reflex was abolished by narcosis. Respiratory movement was limited by adhesive strapping of the lower chest or diaphragmatic paralysis. These conditions often occur clinically in association with inhalations or spinal anesthesia and postoperative dressings, position, or distention. Measures should be taken to decrease or eliminate their danger. One of the best methods, and most important in treatment, is the use of carbon dioxide-oxygen mixtures at the end of anesthesia and at intervals after the operation if there is any tendency toward shallow respiration.

If cough is ineffective, bronchoscopy should be used.

Aerodynamics.—(C. E. Lindskog and C. M. Van Allen (Arch Surg 24:204 (Feb) 1932) present experimental studies on the aerodynamics of bronchial obstruction which throws much light on the apparently contradictory or rapidly changing clinical findings in cases of postoperative pulmonary complications, and in some conditions of inflammatory pulmonary disease. Their introductory paragraph draws attention to well-known facts, then experimental work attempts their explanation. It is well recognized that the intrapulmonary currents of air have an important bearing on pulmonary obstruction. Obstruction from accumulation of secretions complicates bronchitis most frequently when the breathing is superficial. Both prevention and relief of obstruction may be promoted by the application of deep breathing exercises and of vigorous and well-controlled coughing. Following the extensive investigation of Henderson and Haggard in the production of hyperpnea by the inhalation of carbon dioxide, the practice of administering this gas to patients after operation has become a routine measure in many surgical clinics. It is not known, generally, for instance, how deep breathing introduces air into a collapsed section of lung, the bronchi of which are filled with mucus; nor, under the same conditions, how cough evacuates the pus. Conversely, the cause is not clear for the failure of deep breathing and coughing to obtain the results in many cases. Archibald pointed out that the inconstant and diverse effects of cough may be visualized plainly in man and in dogs during fluoroscopic examination of the bronchial tree with the use of radio-opaque oils. A column of such

oil in a bronchus is usually thrown by a cough to the trachea, but at times the oil is thrown to the alveoli, or it is not displaced appreciably in either direction. The force of the impulse received by the oil is evidently governed by the vigor of the cough, but the direction of the impulse is not so determined.

Another obscure subject in bronchial aerodynamics is that which relates to valvular action of masses obstructing the bronchi in the production of pulmonary atelectasis. Numerous cases are known in which a part of the lung collapsed with a rapidity that would appear to rule out absorption as the mode of removal of air, and to explain the circumstances it has been suggested that the bronchus of the collapsed part was obstructed and behaved as a valve permitting air to pass outward only.

Each respiratory cycle resulted then in reducing by a fraction, the volume of air in the lung distal to the obstruction until atelectasis is complete.

A most important fact, information concerning which has not yet become well disseminated, has to do with the newly discovered function of the lung which has been called "*collateral circulation*." Lindskog and Allen (*loc cit*) epitomize their earlier work, which helped to establish the facts of the existence of such function, in the following:

"It will be necessary, first of all, to describe briefly a newly discovered function of the lungs, termed *collateral circulation*, which enters very significantly into bronchial aerodynamics. This function depends on the fact that the *lobular* divisions of the bronchial tree of one pulmonary lobe are intercommunicated abundantly at the periphery, rather than being independent, as has been generally supposed. The interlobular septums of

the lungs are incomplete, and the alveoli at the planes of fusion of the lobules communicate with each other by minute passages (probably the alveolar pores of Kohn) and perhaps, too, by diffusion through the alveolar walls. The communication is brought spontaneously into operation when the bronchus supplying one lobule or group of lobules, becomes obstructed, for then the obstructed part breathes by way of the collateral connections with the parts of the lobe remaining free. Thus, with inspiration, air that passes to the periphery of the *free lobules* enters collaterally into and inflates the obstructed lobules, and, with expiration, air to be discharged from the obstructed lobules escapes by the same path into the free lobules and passes out with the expired air of those parts. Respiration may continue in this manner and maintain the inflation of the obstructed lobules as long as the obstruction lasts. Examples are known in man, as well as in experimental animals, in which large sections of lobes remain fully air-containing indefinitely after the bronchial obstruction. *Collateral respiration is interrupted* whenever the patency of the alveoli and bronchioles at the plane of fusion of the obstructed and free parts of the lung is lost, as may occur from *accumulation of inflammatory exudates and secretions or from insufficient respiratory expansion* [italics ours—Ed]. There is no provision (in man and dogs) for collateral respiration between the lobes of the lung. The interlobar fissures are complete and prevent it. When the bronchus supplying one or more entire lobes is obstructed, the airways of those parts are necessarily isolated from the airways of the rest of the lung and from the outer atmosphere. Broadly speaking, collateral respiration

serves the bronchial system in the same economic capacity as does collateral circulation in the vascular system"

By means of an apparatus with adjustments permitting the placing of the obstruction in either a lobar or lobular position, and by means of valves which could be regulated to produce complete obstruction, or obstruction of an inspiratory or expiratory type, the effects on pressure distal to and proximal of the obstructed point were studied and recorded in an attempt to clarify the problems whose uncertainties have been recognized

The valve arrangements permitted temporary or prolonged partial or complete obstruction, so that the uncontrolled factors in postoperative cases could be simulated very closely. The results obtained in the various experiments are graphically portrayed; the conclusions reached have such a definite value in understanding the clinical problems in question that they are here set down in detail, fearing that an abridgment might reduce their clarity and value

"In all varieties of bronchial obstruction the intrabronchial pressure distal to the point of obstruction oscillates with the respiration about the level of atmospheric pressure, rising above it in expiration and falling below it in inspiration. The intrabronchial pressure proximal to the obstruction oscillates in a similar manner but much less widely

"Accordingly, at expiration the distal pressure is higher than the proximal pressure, and at inspiration the relationship is reversed. The deeper the respirations are, the greater are the oscillations of the distal pressure and the greater the difference between the two pressures. The zone of oscillation of the distal pressure shifts up and down

on the scale of pressures with increases and decreases in the degree of inflation of the obstructed part of the lung. Thus, if the obstructed part contains tidal air (obstruction begun at height of inspiration), the zone lies high, with the expiratory pressure extending markedly above the atmospheric level and the inspiratory pressure falling only slightly below that level; if tidal air is partly, or entirely, missing (obstruction begun during expiration or at its height), the zone is lower and the expiratory pressure is only slightly above the atmospheric level, and if all the tidal air and part of the residual air are lacking (absorbed after obstruction), the zone is still lower and lies entirely below atmospheric pressure

"The intrapleural pressure oscillates with respiration in the same manner and to about the same extent as the distal intrabronchial pressure but at much lower and subatmospheric pressures. The pressures present, also, certain special forms of behavior which are characteristic of the various types and positions of the bronchial obstruction. Different forms of behavior occur because the obstructed and free parts of the lung develop different conditions of inflation. The obstructed part becomes differently inflated in all forms of bronchial obstruction, because air enters or leaves the obstructed part with reduced facility. In those forms of obstruction in which the air tends to be absorbed without being constantly replenished, the differences of inflation are particularly great. The special forms of behavior are as follows:

"In total, lobar bronchial obstruction the zone of oscillation of the distal intrabronchial pressure changes only as the result of absorption of the air. If the zone is high to begin with (tidal air

included), it starts to fall very soon and within a few minutes it comes to rest at a level with the expiratory pressure slightly above the atmospheric pressure (characteristic position when tidal air alone is lacking) This level may be maintained for several hours If the zone is low to begin with (tidal air excluded), it suffers no change for several hours (Four hours was the longest period of observation of these pressures)

"In simple inspiratory, lobar obstruction any tidal air that may be included in the obstructed part of the lung to begin with escapes quickly past the valve, and the zone of oscillation of the distal intrabronchial pressure falls in pace with the loss of air When that air is gone, no more passes the valve and the obstruction becomes total in effect, with the pressure levels stationary, as described in the preceding paragraph The obstructed part is not collapsed by the action of the valve

"In simple expiratory, lobar obstruction air enters rapidly through the valve, until the obstructed part has reached its capacity for air, and then only a little enters from time to time (This is apparently only just enough to make up for absorption) The zone of oscillation of the distal intrabronchial pressure rises in pace with the accumulation of air, and when the capacity for air is reached, the zone remains stationary The expiratory limit of the zone may reach nearly any height, depending on the degree of expiratory effort, and the inspiratory limit may rise above the atmospheric pressure The thoracic parietes expand automatically to accommodate the inflated parenchyma and to maintain the original range of respiratory movement The intrapleural pressure is thus kept unchanged As

additional evidence of this automatic accommodation is the fact that, if the animal is killed at this time, both the distal intrabronchial and the intrapleural pressures rise markedly The obstructed part is emphysematous

"In the 3 types of lobular obstruction *collateral respiration* saves the obstructed part of the lung from such alterations of inflation as develop in lobar obstruction Accordingly, if the obstruction is valvular, air enters or leaves by the valve (depending on the type of valve) with the respiration for indefinitely long periods, and escape or supply of air by collateral connections proceeds concurrently, so that the pulmonary inflation and pressures stay the same The obstructed part becomes neither collapsed nor emphysematous "

The physics of the act of coughing, with the intrabronchial pressure effects proximal and distal to the points of obstruction, were investigated and found to vary greatly, depending on the degree of pulmonary ventilation, or better expansion, distal to the obstruction, ϵ , whether the lobules or lobe distal to the obstruction contained residual, or residual and tidal air

"Cough has 2 phases The first phase begins with the onset of efforts to expire The tracheal passage is blocked completely (by the vocal cords) and the intrabronchial and intrapleural pressures rise sharply The second phase begins after a moment with sudden opening of the trachea The imprisoned air escapes explosively and the intrabronchial and intrapleural pressures fall The object obstructing the bronchus lies between 2 pressures of air during the cough, the relationship between which is determined by the relationship between the inflations of the obstructed and free parts of the lung These relationships

may be changed, even reversed, at any instant in cough. Since the direction in which the intrabronchial impulses tend to displace the obstruction must be that of the action of the greater impulse, and the force is the difference between the 2 impulses, the displacing influence of cough is variable as to both direction and force, even with a constant degree of expiratory effort. If the obstructed part contains tidal air in any amount at all at the beginning of cough, its inflation quickly becomes greater and a displacing impulse develops which is directed toward the trachea.

"If the obstructed part has no tidal air, but a full amount of residual air at the beginning of the cough, its inflation quickly becomes equal to that of the free part and there is no displacing impulse. If, finally the tidal, and a part or all, of the residual air is missing from the obstructed part, its inflation remains the lesser, and there is a displacing impulse directed toward the alveoli. A point to be kept in mind concerning the action of cough is that it depends for aerodynamic eliminative effect on the presence of tidal air in some quantity in the lung distal to the obstruction."

The practical bearing of these finds is summarized as follows.

"Lobular obstruction undoubtedly occurs much more frequently than lobar obstruction. A drop of moisture in a capillary respiratory duct must fill the lumen over a considerable length and prevent the passage of air, so that an obstruction of this magnitude at least, probably occurs in most cases of bronchial catarrh. When cough or other expiratory effort takes place right away, the tidal air originally imprisoned must still be present to serve for elimination of the obstruction, but when the subject sleeps, or for other reasons remains

quiet for a period, absorption proceeds and collateral respiration may compensate for it, and maintain a supply of tidal air for the eliminatory action of cough when rest ceases. It is, therefore, likely that collateral respiration is important in pulmonary economy. A bronchial tree without provision for collateral respiration would be as inefficient as a blood-vascular system without collateral circulation, perhaps more so, since bronchial obstruction is probably more common than arterial obstruction.

"It should be remembered that cough appears to have other means of effecting or promoting broncho-elimination than the action of the intrapulmonary currents of air, at least as far as the larger bronchi are concerned. The walls of the larger bronchi contract with expiration and dilate with inspiration. The movements become very marked with vigorous breathing. We have seen in dogs by bronchoscopy that the lumina of tertiary bronchi become totally obliterated when the animals strain to expire, and the same effect has been observed in man.

"It seems probable that these movements aid broncho-elimination, the first contraction first serving to mould any soft plastic mass that lies in the bronchus and to squeeze it along the passage, and the dilation then permitting air to be expired past the mass. Tidal air would thus be provided to the obstructed part of the lung, and subsequent coughing would be rendered more productive. The deep breathing that is advocated clinically for relief from bronchial obstruction obtains the result only in this manner, it would seem, when a lobar bronchus is obstructed, but when a lobular bronchus is affected, both this mechanism and that of collateral respiration may be called into opera-

tion to bring air to the affected part. Indeed, as regards the action of collateral respiration, experiments have shown that deep breathing markedly increases the rate of transmission of air to and from obstructed lobules. The transmission has been found to cease altogether in very shallow breathing."

While the clinical application of the findings of Lindskog and Van Allen are in no way limited to the field of thoracic surgery, the indications of possibility of such clinical applications appears timely in this setting.

The underlying factors in conditions of postoperative pulmonary complications in general, and those in the major phenomenon of massive pulmonary collapse or pulmonary atelectasis, in particular, are of interest and importance. Where the operative field has been in the thoracic area, especially where collapse operations of various types have been done, the problem of posture and internal drainage with prevention of spillage into normal areas, maintenance of cough reflex as a protective measure, etc., comes into consideration. In general surgery, the factors of recent or still active pulmonary infection, the surgical field itself with its influence on respiratory activity during the postoperative days, the anesthetic, with its possible effect on bronchial secretion, and its effect on respiratory activity during the operation and the immediate postoperative period, the effect of splinting dressings and postoperative posture, etc., all enter for consideration.

It might be briefly stated that one seeks to maintain the functional activity and, therefore, the aerodynamic value of collateral respiration. In the analyses of series of cases of postoperative pulmonary complications, individual authors lay stress and emphasis upon

various aspects of the problem, by a review of a group of such studies correlation of the many prophylactic and therapeutic measures is possible.

E. L. Eliason and C. McLaughlin (Surg Gynec Obst 54 716 (Dec.) 1932) say "Clinical and experimental evidence indicates that areas of lobular collapse, with and without symptoms and signs, occur in a large proportion of postoperative cases, especially following laparotomy in the upper abdomen. If the affected area be sufficiently large, symptoms are usually apparent. If the area be small and not infected, it tends to recover spontaneously. If, however, these atelectatic areas become infected from an existing bronchitis, aspirated oral secretion, or by septic emboli, the picture becomes that of a postoperative bronchopneumonia or lobar pneumonia, depending upon the size of the involved area and the virulence of the infecting organisms."

Of 120 cases of postoperative pulmonary complications in a series of 7326 operations, done on Surgical Service C of the University of Pennsylvania during the years 1922-1931, "19 had colds or chest signs at the time of operation—all but 5 of these were acute surgical emergencies or septic cases and immediate surgery was required. Of these 19 patients with respiratory infection, 6 succumbed directly as the result of their respiratory complication and 4 others died, the pulmonary complication being a contributing factor in causing their death. The respiratory morbidity of 1.68 per cent and mortality of 0.5 per cent in the whole group makes a contrast that teaches an important lesson and justifies the statement that "at least 2 weeks should intervene between the last symptom of the cold and the surgical procedure."

Despite the great increase in the available methods of anesthesia, the incidence of pulmonary complication has not appreciably declined, and acceptance of these postoperative pulmonary developments as "ether pneumonias," as was taught and believed for so long, is no longer possible. A. L. Brown and M. W. Debenham (J. A. M. A. 99:209 (July 16) 1932) Postoperative pulmonary complications, base their study on an unselected group of 812 consecutive case histories, in which the choice of anesthesia depended on the individual surgeon, and in which the tables show that about as many serious major operations were done under general anesthesia as under spinal anesthesia. The analysis revealed the following:

	Cases	Postop Complications	Per Cent
Inhalation anesthesia	474	6	1.3
Subarachnoid anesthesia	338	25	7.4

"In the majority of instances atelectasis was the complication found. Moreover, as has been pointed out frequently, the more closely the operative procedure approaches the region of the diaphragm, the greater is the incidence of postoperative pulmonary complications." The explanations advanced for this great preponderance of complication in spinal cases are as follows: "First, spinal anesthesia definitely inhibits the force and depth of respiratory movements, not only during the operation itself, but for a considerable period afterward. It is these respiratory movements (both intrinsic and extrinsic) which tend to rid the tracheobronchial tree of foreign matter or secretions. Second, the normal viscosity of the secretions of the tracheobronchial tree appears to be increased, *i. e.*, the material is more tenacious following spinal anesthesia. Third, following operation un-

der spinal anesthesia, the patient tends to remain quiet for a number of hours."

The influence of the anatomic site of the operative field on respiratory activity and pulmonary complications, and its practical bearing by the avoidance of tight dressings is again noted by Eliason and McLaughlin (*loc cit*). "Recently, Muller, Overholt and Pendergrass have offered convincing evidence that a high diaphragm with a loss of its normal pumping action is the primary cause of the collapse, while the bronchial obstruction is considered secondary. They found that following upper abdominal operations thoracic expansion was reduced 70 per cent. and diaphragmatic excursion was decreased 66 per cent. with a resultant loss of 75 per cent. in lung capacity. They further showed that 76 per cent. of a series of patients examined by x-ray the first day following upper abdominal operations, showed an elevated diaphragm with increased trunk shadows interpreted as being the first step in the development of a lobular collapse. These studies essentially substantiate those of Churchill and McNeill who found that following upper abdominal operation the vital capacity was reduced 50 to 88 per cent. of the normal with an incidence of pneumonia approaching 5 per cent. In lower abdominal operations the vital capacity was reduced 20 to 70 per cent.; with an incidence of pneumonia of 0.75 per cent. Following operations on the head, vital capacity was but little interfered with and pneumonia occurred in 0.3 per cent. or less of the cases." Sise has shown that the use of a tight upper abdominal binder alone can reduce the vital capacity of a normal chest 30 per cent. The marked difference in incidence of these complications in *male* and *female* has been noted by several

observers quoted, in some the males outnumber the females 3 to 1. "These facts can best be explained by the greater embarrassment to the normal abdominal and diaphragmatic respiration in the male following laparotomy, while the female with costal respiration is less handicapped by the operative procedure."

To avoid pulmonary complications, encouragement in breathing exercises is begun, "as soon as they are conscious following anesthesia. These consist in taking at least 10 deep breaths each waking hour. They are told to inspire slowly and gently and then to expire rapidly. The slow inspiration causes less pain and consequent inhibition, while the more forcible expiration not only is not painful, but tends to force the mucus up into position where the cough reflex will dispose of it. In all abdominal cases in which it is possible, the patients are turned from side to side at intervals of 2 hours by the nurses, this procedure alone is very important."

Experimental evidence of the value of the increased respiration, and substantiation of the basis of the value of carbon dioxide inhalations in the production of an increase, where the patient is unable or unwilling to cooperate, is given by S. Brill, M. Prinzmetal and H. Brunn (*J. Thoracic Surg.* 1:243 (Feb.) 1932). In their work, these investigators find that the inhalation of carbon dioxide resulted in a more negative intrapleural pressure and an increase in the thoracic girth similar to that produced by bronchoconstricting drugs. They believe that 2 mechanisms are operative: a bronchodilation which facilitates the exchange of air, and (2) an increase in the mean thoracic girth, more negative intrapleural pressure, and greater dis-

tention of the lungs, which increase the respiratory exchange.

Carbon dioxide inhalations aid in combating the postoperative pulmonary complications. The hyperpnea produces a greater lung expansion, temporarily increases the tendency and ability to cough, and facilitates in these ways the expulsion of mucus. With this, the air channels are enlarged and the chest girth and capacity increased, with consequent increase in the negative side of intrapleural pressure. There is thus obtained a physical condition favorable to the prevention of pulmonary collapse (as was said earlier in this section, conditions favorable to the maintenance of the "collateral respiration").

ATHEROSCLEROSIS.—Arteriosclerosis in its simplest form begins as a degenerative process in the intima of the blood-vessels. In the early stages, it is characterized by lipid infiltration, in the later stages by fibrous tissue proliferation and calcification. Ulceration and thrombosis may develop especially when the process occurs in the large vessels. When the arterioles are affected, they are likely to become occluded during the early stages and the later changes may never occur.

Since the study of arteriosclerosis is progressing so slowly, Pearl Zeek (*Am. J. M. Sc.* 184:350 (Sept.) 1932) made an investigation of more than 1000 autopsies on individuals under 30 years of age. Of these individuals there were found definite atherosclerosis of the aorta, arteries or arterioles in 79 cases, 9 of which were under 6 years of age, and historically presented unusually complex histories. Seven of the 9 showed lesions in the kidneys, 8 showed chronic lesions elsewhere in the body, some of which were certainly present before

birth The only other findings occurring with greater frequency than in the large group without arteriosclerosis were hypoplasia of the splenic corpuscles and lesions in the suprarenal medullæ

Of 18 cases with atherosclerosis dying between the ages of 12 and 21 years inclusive, 10 had rheumatic heart disease In these cases, the vessels most frequently affected were the pulmonary and coronary arteries and the first portion of the aorta In the cases without atherosclerosis dying within this age period, there was only 1 case of rheumatic heart disease, and this case died with lobar pneumonia within 2 months of the onset of the rheumatic disease The remaining 8 cases in this age group all had chronic renal lesions Two died of far advanced arteriolar nephrosclerosis accompanied by generalized small vessel sclerosis One patient died of diabetic coma at the age of 17 years and showed large atheromatous plaques in the aorta Splenic follicular hypoplasia and suprarenal lesions were found in 2 cases each

In the age group between 22 and 29 years inclusive, there were 48 cases. Although the majority of these were not pediatric cases at the time of death, many of the lesions were present since childhood, as verified by the clinical history

Rheumatic heart disease and chronic renal disease occurred with striking frequency Twelve of the 48 atherosclerotic cases had rheumatic heart disease, while only 1 of the nonatherosclerotic had this affection In the 79 cases studied, it is easily seen that chronic renal lesions and rheumatic heart disease occur with entirely too great a frequency in the group to be coincidental. Furthermore, in the rheumatic cases the

atheromatous changes occurred almost exclusively in the larger pulmonary and coronary arteries and in the ascending aorta, while in the nephritic cases, vascular lesions were most frequent in the arterioles of the kidneys In the rheumatic cases atheromatous lesions in the mural and valvular endocardium were found similar to the intimal lesions in the arteries.

Four cases of diabetes mellitus came to autopsy in the group All of these showed atheromatous lesions in the aorta Recently a large amount of experimental work has been performed on the subject of hypervitaminosis in its relation to arteriosclerosis in children It has conclusively been demonstrated experimentally that marked vascular changes with calcification are produced by toxic doses of irradiated ergosterol That the calcification in the vessels is preceded by lipid deposition and is identical with the process of atherosclerosis in human beings, has not been so unquestionably shown, although certain observers claim to have demonstrated the similarity of these lesions by giving less toxic doses, thereby slowing up the process so that early precalcification stages could be noted

Shelling is of the opinion that the toxicity of viosterol depends upon (1) differences in the potency of the irradiated product, (2) age of the recipient, (3) length of time of administration, (4) character of the diet in regard to its content of calcium and phosphorus Thus far, it is not known whether administration of any of the irradiated products on the market today has ever produced vascular lesions in children It is commonly believed that therapeutic doses are not harmful. However, caution demands: that (1) administration be kept within the hands of a physician;

(2) that in the determination of dosage, such factors as diet, age of the patient and degree of need for the irradiated product be carefully considered

Sixty-two cases of rheumatic heart disease were studied by Pearl Zeek (*Ibid* 184 356 (Sept) 1932) with reference to the incidence of atheroma, especially in the aorta, coronary or pulmonary arteries. In 28 cases under 31 years of age, the degree of atheroma was compared with its duration and extent of the cardiac lesions.

Rheumatic heart disease was found to predispose to the early development of atheromatous lesions in the aorta, pulmonary and coronary arteries, and also in the valvular and left atrial endocardium. Lipoid deposits also were found in certain cases in the inflamed serous membranes and in certain renal tubules. Lipoid deposition was thought to begin soon after the onset of cardiac disease and paralleled in general the degree of the cardiac lesions. The atheromatous

changes in many of the cases were progressive, leading to calcification and, in the valvular endocardium, to accentuated stenosis.

ATROPINE.—An atropine test in the *diagnosis of asthma* has been advocated by M. Gillespie (*Brit M J* 2 384 (Aug. 29) 1931) as a method of estimating the part played by nervous stimuli in inaugurating the bronchospasm of asthma. It is suggested that a full dose of atropine be injected subcutaneously at the onset of an attack and in those cases where contraction of the bronchial muscle is due to direct chemical stimulation of the muscle, atropine would be expected to have no effect, whereas in the truly nervous type the attack would be aborted. In this way, Gillespie believes that the patients whose attacks are due to physical stimuli alone could be differentiated from those who owe their symptoms to a fundamental chemical alteration of the blood.

B

BACTEREMIA.—It is a reasonable assumption to state that bacteria may enter the blood stream in persons suffering with either acute or chronic infections. Thus, if suitable and accurate methods of obtaining blood culture are maintained, a greater incidence of positive cultures may be anticipated from patients with frank foci of infection.

For this study, A. F. Reith and T. L. Squier (*J Infec Dis* 51 336 (Oct) 1932) picked 293 individuals all active in an occupation and considered to be healthy. A complete history and physical examination was made, including dental x-rays and examination of the

prostate, sinuses, etc., for any focus of infection. Bacterial growth was found in 113 of the 293 blood cultures. Of the 113 cultures, 20 contained frank contaminants of the subtilis and sarcina groups, 28 contained staphylococci, while 65, with growth of streptococci, diplococci, diphtheroids, *M. catarrhalis*, colon bacilli, or strict anaerobes, were regarded as positive.

In the 293 cases there were 194 with chronic focal infection and 99 in whom the authors could demonstrate no focus of infection. Fifty-three, or 27 per cent, of the cultures from persons with focal infection were positive in contrast with 12, or 12 per cent, of the cultures

from the group of 99 without demonstrable focal infection

The high incidence of growth of streptococci in cultures from persons with pain in the joints or muscles seems to contribute additional evidence to the fact that streptococci are an etiologic factor in chronic infectious arthritis. In those individuals without demonstrable focal infection a seasonal variation in the incidence of positive blood cultures was attributed to the acute respiratory infections.

BASAL METABOLISM.—In discussing the errors in basal metabolism, R. L. Jenkins (Arch Int Med 49:181 (Feb) 1932) speaks of the importance of the "normal range of basal metabolic rate," and feels that for a proper evaluation of this normal range it is important to know, first, the measure of the central tendency of metabolism in normal persons—the "zero point," and, second, the measure of the spread of basal metabolism of normal persons about this "zero point," or a measure of the dispersion of the distribution.

Every metabolism standard has a zero point, but this may vary with different sets of standards for adults as much as 9 per cent, and with children even more.

These differences are not due to chance, but are due either to real differences of the population studied or a difference in laboratory technic.

This precludes the use of a given zero as a true standard of a particular population and laboratory without experimental verification. The author cites instances to show that the "normal zero" in a community in which much hyperthyroidism exists is higher by 5 to 7 per cent than the zero in a community in

which there is a preponderance of normal individuals. He feels that a standard for any given locality may be obtained by making determinations of a minimum of 25 normal persons or of taking the nodal point of a large series of unselected cases.

The normal dispersion is a product of the true normal range and the errors of measurement. The dispersion should be kept at a minimum. The use of the Harris-Benedict standard or the Dreyer standard based on observed weight reduces the normal range as compared with the Aub-Dubois standard.

The error introduced by the standard may be further reduced by comparing 2 or 3 standards in all doubtful cases. A definition of the normal range of basal metabolism is necessarily arbitrary. The usual delimitation of the normal range to 21 per cent is probably low even when good technic is used and it might be supplemented by regarding all cases deviating 10 to 17 per cent from the zero point as doubtful.

The importance of elevation of the pulse rate and pulse pressure in the diagnosis of thyroid disturbance has long been recognized. In 1924, Read published a formula for the prediction of the basal metabolic rate from the basal pulse rate and the basal pulse pressure.

$$0.75 (\text{pulse rate} + 0.74 \text{ pulse pressure}) - 72 = \text{basal metabolic rate.}$$

Jenkins, from a large series of determinations, calculates the basal pulse complex from the pulse rate and pulse pressure. The values are comparative to the basal rate for adults. This is not recommended as a substitute for basal metabolic rate, but rather a confirmative measure in doubtful cases and a method

of checking the course of the disease while under treatment

A Topper and H. Mulier (Am J Dis Child 43 327 (Feb) 1932) studied the basal metabolism of 28 girls and 10 boys from 10 to 16 years of age at intervals of 6 months to a year above a period of from 1 to 4 years. It was found that there was an increase in the basal metabolic rate in the prepubescent period reaching its maximum around the time when catamenia was established in girls and sexual maturity in boys, with a subsequent decline afterward. There was no uniformity in the height of the increased metabolism or in the duration of the increase. Some of these children had no other symptoms of an enlarged thyroid gland. Others presented such symptoms as enlarged thyroid gland, tremor, nervousness, vasomotor instability, cardiac murmur and tachycardia. All of these symptoms disappeared as the basal metabolic rate returned to the previous normal level when puberty was well established. The authors feel that an increased basal metabolism is physiologic during *pubescence*.

This increased metabolism coincides with the physiologic age rather than with the chronologic age, and occurs earlier in girls than in boys, coincident with their earlier pubescence. As there seems to be an individual variation in the height and duration of the increased metabolism, it makes the adoption of normal standards difficult for this important age period. The increased basal metabolism may be associated with symptoms simulating organic heart disease or more especially exophthalmic goiter. In evaluating high metabolic figures at this period, the clinical manifestations of pubescence have to be considered. Exophthalmic goiter is rare before puberty and should not be con-

fused with the physiologic overactivity of the thyroid gland in pubescence, which is temporary and the prognosis of which is excellent.

[It is of interest to recall that recent work on basal metabolic rates in *diabetic children* shows much the same results and as puberty occurs later in the diabetic, there is a later rise in the metabolic rate—ED.]

A very interesting series of experiments on the basal metabolic rate in *hypnotic sleep* is reported by J. C. Whitehorn, Helger Lundholm, E. L. Fox, and Francis Benedict (New England J Med 206 771 (Apr 14) 1932). Two subjects used who were, to some extent, trained in basal metabolic reading. The reading during hypnosis was made with the aid of the breathing helmet developed by one of the authors. From their observations they conclude that

- 1 Hypnosis may help in bringing an untrained subject into the basal stage more rapidly than simple training, but that this depends merely upon the greater efficacy of hypnosis as compared with ordinary assurance in overcoming the subject's anxiety.

- 2 Simple hypnotic sleep with suggestions for relaxation and euphoria does not reduce the rate below the normal basal level and in this respect differs from normal sleep.

- 3 The heart rate was slightly reduced by hypnosis.

G. Wakeham and L. O. Hansen (J Biol Chem 97 155 (July) 1932) report the results of their studies of the basal metabolic rate in *vegetarians*. They found the average reading of 20 life-time vegetarians was 11 per cent. below the DuBois standard. A study of a large group of long-time vegetarians indicated that a period of 6 to

8 years of vegetarianism is required to produce this result. Occasional lapses from strict vegetarianism on the part of the habitual vegetarian do not affect the average rate.

In contrast to this, R. A. Hetler (J. Nutrition 5:69 (Jan) 1932) studied the urinary nitrogen excretion, basal metabolic rate and food intake of 85 college women to determine the possible relationship between protein intake and basal metabolic rate.

The average protein intake was 0.94 grams per kilogram of body weight per day. This was somewhat lower than the protein ingestion characteristic of male students. The average basal metabolism for the group was lower than the standard. The deviation of the actual basal metabolic rate for the Harris-Benedict standard averaged -7.1 per cent. The author could find no definite interrelationship between the protein intake and basal metabolic rate. It is suggested, however, that the lower protein intake for women may be in part responsible for the fact that their basal metabolic rate is lower than that of men.

As a result of his study of the blood sedimentation test in *hyperthyroidism*, G. Bredemose (Hospitaltid 75:319 (Feb 11) 1932) feels that it is without practical value and cannot be used to supplant basal metabolic reading as a diagnostic test or in evaluation. This is in contradiction of the work of Goldman and Tatenka.

BILIARY TRACT.—PHYSIOLOGY.—Recent work on gall-bladder function has been summarized by I. S. Ravdin and C. G. Johnston (Pennsylvania M. J. 35:357 (Mar) 1932). Chloride is rapidly removed from bile in the normal gall-bladder; calcium is removed to some extent but

is also concentrated, bile salts are also slowly absorbed and concentrated. To the concentrated bile, mucus is added. Cholesterol and bile pigment are not absorbed. The damaged gall-bladder wall pours fluid into the organ. The fluid contains chloride, cholesterol, traces of calcium and a high concentration of bicarbonate.

The authors believe that the uniform failure to produce experimentally cholecystitis in healthy gall-bladders by the introduction of bacteria into the lumen is strong evidence against the probability of gall-bladder disease arising from the portal route or from ascending ductal infection. Hence, systemic infection is the most likely source.

Although most gall-stones are the result of infection, it is believed that the large single cholesterol stone is metabolic in origin and may occur without evidence of inflammation.

R. Elman and E. A. Graham, from recent experiments (Arch. Surg. 24:14 (Jan) 1932), concluded that (1) the gall-bladder does not absorb cholesterol, (2) that it has the power of excreting cholesterol; and (3) that inflammation may accelerate this excretion. The authors apply this information to the problem of the *strawberry gall-bladder* (cholesterosis) first described by Moynihan, in 1909, and stated by Illingworth, in 1929, to comprise about one-fifth of all diseased gall-bladders removed at operation. They found that in dogs ligation of the cystic duct increased the cholesterol content of gall-bladder bile, especially if infection occurred. A comparison of the cholesterol content of liver and gall-bladder bile showed a higher concentration in the latter, both in humans at operation and in dogs. Comparing the change in cholesterol content of liver and gall-bladder bile

with concentration of bile pigment, they found greater variation in the former than in the latter and concluded, therefore, that concentration by the gall-bladder could not account for the cholesterol increase, and that secretion must occur. Inasmuch as it has been found that cholesterol solubility in bile is determined by bile salt concentration, and since bile salts are absorbed by an inflamed organ, which also secretes cholesterol, it seems likely to the authors that cholesterol may be deposited on the mucosa, giving rise to the familiar picture of the strawberry gall-bladder.

A. L. Wilkie and H. Doubilet (Canad. M. A. J. 26: 582 (May) 1932) injected into dogs' gall-bladders bile obtained from the common duct having a known cholesterol content. The cystic duct was ligated. They found that in normal animals with cystic duct occlusion cholesterol passed from the blood into the gall-bladder if the blood cholesterol level was higher than that of the gall-bladder bile, and *vice versa*. The amount of cholesterol passing through the gall-bladder wall and its direction depends upon the blood—bile cholesterol ratio.

The *effect of pregnancy* on the physiology and pathology of the gall-bladder has been studied in dogs by W. Schaefer (Arch. f. Gynak. 150: 696 (Sept.) 1932). He found an increased content of cholesterol in the bile of pregnant animals. Toward the end of gestation gall-bladder bile contains a decreased amount of cholesterol, the level remaining low for several days after delivery. The pH values of bile changed little if at all during pregnancy. The author believes that bile stasis with added cholesterol content in the presence of unchanged concentration of bile-acids favors formation of gall-stones.

The mechanism of gall-bladder emptying has received much study. Many investigators have concluded that nervous regulation is paramount while others, notably Ivy, have concluded that hormonal control is the important factor. L. A. Crandall, Jr. (Arch. Int. Med. 48: 1217 (Dec.) 1931) studied various possible mechanisms. In dogs subject to "sham feeding" no emptying was observed, while introduction of egg yolk into the stomach *via* fistula resulted in emptying of the gall-bladder. Splanchnic and vagus stimulation in dogs was without effect. In humans, psychic stimulation caused no emptying. The author concludes that the liberation of an hormone (cholecystokinin) "by the action of fat or of acid in the intestine is the major factor concerned in the contraction and evacuation of the gall-bladder that follows a mixed meal."

BACTERIOLOGY—B. B. V. Lyon (J. Lab. and Clin. Med. 17: 583 (Mar.) 1932) has reviewed the findings of 1450 cultures obtained from the bile of 988 patients during the course of biliary drainage by duodenal tube. The author believes that despite "certain obvious inaccuracies, bacteriologic inferences can be made which are of such value both in diagnosis and in treatment as to make it imperative that we do not entirely disregard this aid in diagnosis." Of the 988 patients studied, 64 showed no evidence of gastrointestinal disease and were considered normal. Ninety-three patients represented functional disorders. These 2 groups presented the highest incidence of sterile cultures. A third group of 162 cases represented various grades of organic gastrointestinal disease exclusive of the biliary tract. Thirty-two of these patients were operated and showed no evidence of gall-bladder disease. A fourth group

TABLE I
SUMMARY OF BILI CULTURES

	Patients	Cultures	Sterile	Contaminated	Pure	Mixed
Total No	988	1450	240 0	188 0	629 0	393 0
Per cent			16 5	12 9	43 4	27 1

A summary of some of the subgroups described above shows the following

CULTURES

Group	Cases	Sterile, Per Cent	Contaminated, Per Cent	Positive, Per Cent
III	162	24 1	14 8	61 1
IV	404	9 2	9 7	81 1
V	69	10 0	11 6	78 4
VII	74	6 8	8 1	85 1

of 404 patients were cases of biliary disease, 101 cases being proved at operation. In a large majority of these operative cases the culture taken at operation checked with that taken preoperatively. In a fifth group were placed 69 patients who had had previous biliary tract surgery. A sixth group of 154 patients were considered as having mild biliary tract pathology, diagnosed by duodenal tube findings. This group contributed the highest percentage of positive cultures and represented the greatest benefit by duodenal tube treatment. A seventh group consisted of various types of liver disease not included in other groups or overlapping other groups.

Table I summarizes the cultural findings in the entire group.

The author calls attention to the distinctly higher percentage of positive cultures in Groups IV, V and VII (patients with biliary tract disease) than in Group III (patients without biliary tract disease).

In an eighth group of 385 patients classified as having symptoms of hepatic intestinal toxemia, a high incidence

(56.7 per cent) of positive pure cultures of *B. coli* was found. Lyon believes this indicates a breaking down of the bactericidal function of the liver.

The author concludes that *B. coli*, *B. typhosus*, and *B. pyocyaneus* are not contaminants, but genuine infections. In the group of pyogenic cocci less positive conclusions can be drawn but in many cases they should be regarded as transplants rather than contaminants.

The importance of anaerobic infections of the gall-bladder has been mentioned by several observers. Williams and McLachlin, in 1930, reported *B. welchii* in 6 out of 97 cases of acute and chronic cholecystitis. G. Gordon-Taylor and L. E. H. Whithy (Brit. J. Surg. 19: 619 (April) 1932) report findings in 50 cases of cholecystectomy. Cultures were planted from the bile, gall bladder wall, and from stones. The results are summarized in Table II.

It was noted that intestinal bacteria were present in 31 cases. *B. welchii* was present in 10 cases. Intestinal bacteria were the most frequent types found in gall-bladder infection, according to these authors.

TABLE II

BACTERIA ISOLATED FROM GALL-BLADDER WALL, FROM BILE, AND FROM STONES

Cases		Analysis
All 3 infected	7	2 enterococcus, 1 <i>B welchii</i> ,* 1 <i>Sta albus</i> , 3 mixed (<i>B coli</i> * and <i>B welchii</i> , <i>Str viridans</i> and <i>B lactis aerogenes</i> , <i>B coli</i> * and enterococcus and <i>B welchii</i>)
Wall only	20	7 <i>B coli</i> (4*), 2 <i>B welchii</i> ,* 2 enterococcus, 1 <i>Sta albus</i> , 8 mixed (2 <i>B coli</i> and <i>B welchii</i> , 2 enterococcus and <i>B welchii</i> , 3 enterococcus and <i>B coli</i> , 1 <i>B coli</i> * and <i>Str viridans</i>)
Wall and bile only	7	1 enterococcus, 3 <i>Sta aureus</i> , 1 <i>B paratyphosus B</i> ; 2 mixed (2 <i>B coli</i> and enterococcus)
Stones only	3	1 <i>B welchii</i> , 1 <i>Sta aureus</i> , 1 mixed (<i>B coli</i> and <i>Sta albus</i>)
All 3 sterile	13	
Total	50	

* Acute cases

Incidence of various organisms in 50 cases, including mixed infections *B welchii*, 10, *B coli*, 18, enterococcus, 13, *Sta aureus*, 4, *Sta albus*, 3, *Str viridans*, 2, *B paratyphosus B*, 1, *B lactis aerogenes*, 1

The rôle of the colon bacillus in biliary lithogenesis is described by H J d'Amato and A Toroz (Semana méd 1 358 (Feb 4) 1932), who made observations in 42 patients with biliary calculi (either with or without lesions of the gall-bladder). They conclude that the colon bacillus is a frequent cause of infection and the most frequent cause of biliary lithogenesis. The clinical picture of biliary lithiasis when caused by the colon bacillus is characterized by a prolonged and attenuated evolution of the disease. The patients have a subfebrile temperature, with changes of an intermittent type, and long remissions in the appearance of the symptoms. They give a history of intestinal disturbances with either constipation or diarrhea. As a rule, the bowels move every 3 or 4 days. The colon bacillus appears and disappears intermittently in and from the urine (and sometimes simultaneously in the blood and in the bile). Hence, the advisability of a repeated bacteriologic examination of the urine (the most common route of elimination of the bacil-

lus) if there are any symptoms of infection or intestinal disturbances. If the colon bacillus is not identified after repeated bacteriologic examination of the urine in patients with biliary calculi, the etiology of the disease should be considered as of a noninfectious nature. Sixty per cent of the cases of biliary calculi are of infectious origin (40 per cent of which are caused by the colon bacillus). The colon bacillus may be identified simultaneously in the urine and in the bile or alone in the urine, but never alone in the bile. Colibacillemia may exist in patients with other diseases than biliary calculi. In some of these cases, catarrhal lesions in the gall-bladder (the so-called lithogenic catarrh), which precede the formation of biliary calculi, are observed, while in other cases the liver and gall-bladder remain normal. Renal calculi are a frequent complication in patients with biliary calculi and colibacillemia, and rarely occur in patients with biliary calculi without colibacillemia. The identification of the colon bacillus from the urine in patients with renal lithiasis

should cause the examiner to suspect the presence of biliary calculi, which are discovered in all cases properly investigated

DIAGNOSIS—The use of a choleretic, decholin-sodium, has been suggested by I R Jankelson and W S Altman (New England J Med 206 796 (April 14) 1932) as an aid in cholecystography. According to these writers, this drug has a two-fold effect: acceleration of the appearance of the gall-bladder shadow, and demonstration of the distensibility of the gall-bladder wall. The technic devised by the authors includes intravenous administration of tetra-iodophenolphthalein followed immediately by intravenous injection of 10 c.c. of 20 per cent decholin-sodium. The filled gall-bladder can be demonstrated on plates within 3 hours, according to these observers. It has also been possible to demonstrate the gall-bladder within 5 or 6 hours after oral administration of the dye. The usual dose is given in the morning, followed in 4 hours by 10 c.c. of 20 per cent decholin-sodium. The gall-bladder can be demonstrated 1 to 2 hours later.

The most important use of this drug, however, according to the writers, is obtained by its administration after the gall-bladder has been visualized by the usual methods. Within 15 minutes after the injection, an increase in size will be noted in the normal gall-bladder. This distention reaches its maximum in 45 minutes. By the combined procedure, the patency of the cystic duct, the size, shape, and position of the gall-bladder, and the distensibility or deformity of the organ are all demonstrated. Failure to enlarge after decholin-sodium injection usually indicates a thickened wall, but may be indicative of sufficient liver dysfunction to prevent choleresis.

CHOLELITHIASIS — COMPOSITION—The composition of 26 gall-stones was carefully analyzed by M. Pickens, G. O. Spanner, and L. Bauman (J Biol Chem 95 505 (Mar) 1932). The average cholesterol content was 94 per cent, although the "solitary stone" was found to be composed of 98 to 99 per cent cholesterol. After extraction of cholesterol, the residue was composed largely of calcium carbonate and calcium salts of bilirubin and "other bile pigments." No bile salts, and only traces of fatty acids were found. Other observers have found that human gall-stones are soluble in dog's bile. In comparing the solubility of cholesterol in human and dog bile, it was found that human bile contained an average of 229 mgm. of cholesterol per 100 c.c. before saturation but was able to absorb to an average of 278 mgms., while dog bile showed an average of 36.8 mgm. per cent. before saturation and 228 mgm. per cent after. This greater solubility for cholesterol in the dog bile probably explains the solubility of human gall-stones in dog bile, according to these authors.

Uffreduzzi (Boll. e. mem. Soc. piemontese di chir. 2:531 (May 14) 1932) found in a patient a gall-stone consisting almost completely of calcium carbonate. A review of the literature of the subject showed no similar case reported. He states that calcium frequently enters into the composition of biliary stones but only in combination with bilirubin or cholesterol or in compound stones. The mucosa of the cholecystic wall undoubtedly produces calcium, but this cannot explain a pure calcium carbonate calculus.

According to D. B. Phemister, A. G. Rewbridge and H. Rudisill, Jr. (J. A. M. A. 97:1843 (Dec. 19) 1931), large

gall-stones in man consisting of a high percentage of calcium carbonate have been rarely reported and no associated factors have been mentioned as specifically influencing their formation. In a study of 7 cases diagnosed as such, the observation was made that in every case the cystic duct was obstructed by a cholesterol-bile pigment, or cholesterol stone, indicating that the duct obstruction was a precursor to and a determining factor in calcium carbonate stone formation in the gall-bladder. The authors conclude that (1) large calcium carbonate stones may form in the gall-bladder in cases of cholelithiasis and cholecystitis with chronic obstruction of the cystic duct by a stone, and it appears that duct obstruction is essential for their formation. The calcium is apparently excreted by the mucosa of the gall-bladder, (2) calcium may be deposited on the stone, in the duct, so that the diagnosis of its presence as well as that of the calcium carbonate stones in the gall-bladder may be made from x-rays, (3) calculous obstruction of the cystic duct followed by extensive degeneration and fibrosis of the gall-bladder may result in marked calcification both of its wall and of that of the cystic duct at the point of impaction.

PATHOGENESIS.—Experimental production of gall-stones is outlined by C. A. Hospers (Arch Path 14 66 (July) 1932). The author states that a combination of hypercholesteremia, induced by intraperitoneal injections of a watery emulsion of cholesterol, and infection of the gall-bladder, produced by direct cystic injection of *Bacillus typhosus*, failed to lead to the formation of cholesterol gall-stones in rabbits. Pigment calculi were formed in many of the gall-bladders, and in some of the

rabbits cholesterol crystals were found on examination of the bile. In no instance, however, had any appreciable quantity of the cholesterol been incorporated in or incrustated on the pigment stones.

In a review of the literature, the author gives the numerous methods used in attempts to produce gall-stones experimentally. Foreign bodies in the gall-bladder have frequently become coated with pigment. Stasis alone has been unsuccessful but, when combined with infection, has on occasion led to the formation of pigment stones often combined with carbonates. Cholesterol stones have been found in hypercholesteremic animals in a few instances, but these results have failed of confirmation. Recently, minute cholesterol stones have been reported in a few vitamine-deficient animals. Various combinations of the methods named have given no better results. No method has been found that will produce gall-stones, especially of the cholesterol type, with any degree of certainty.

The problem of cholesterol gall-stone formation is essentially that of precipitation of cholesterol in the bile, according to E. Andrews, R. Schoenheimer and L. Hrdina (Arch Surg 25 796 (Oct) 1932). This may be pure in crystalline form or combined with varying amounts of bile pigments or calcium. According to Peel, 80 per cent of the average stone is cholesterol.

There are 2 problems to solve in the formation of these stones: (1) the means by which the cholesterol in the bile is precipitated, and (2) the circumstances which are necessary sometimes to bring about typical stone formation with radial and concentric arrangement of crystals and at other times only single crystals.

The study of cholesterol stone formation is a human problem because these stones are never found in any other animal. Studies have shown that the blood cholesterol and biliary cholesterol are not proportional. It is a common misapprehension that most of the cholesterol in the bowel is biliary in origin, whereas the overwhelming majority of it is excreted directly from the intestinal mucosa. The second important point is the insolubility of cholesterol in water. Bile salts seem to have the power of dissolving large amounts of this relatively insoluble substance. Four conjugated bile acids are important in human bile, *i.e.*, glycocholic and taurocholic acid and glycodesoxycholic and taurodesoxycholic acid. Extreme difficulty has been experienced in attempts to separate these acids from cholesterol.

Experiments performed by the authors to determine which of the various bile acids was responsible for the solubility of the cholesterol in the bile, showed that it was desoxycholic acid. In these experiments, whenever the bile salts were removed, the cholesterol precipitated.

The experimental work of the authors in precipitating the various bile acids in rotation by specific substances indicated that each of the fractions carries with it part of the cholesterol. A synthetic preparation of the various complexes was carried out and it was found that those isolated from the bile and those synthetically prepared were in every instance identical. These compounds were found to be very unstable and the addition of an organic solvent permanently breaks up the complex, owing to the fact that these solvents themselves displace the cholesterol and enter into similar complexes with the bile acids.

Dialyzing experiments revealed that bile acids, by leaving the membrane and coming outside, had so reduced the bile acid content within, that there was not sufficient solvent left to hold the cholesterol in solution and it was, therefore, precipitated within the membrane. This did not occur with desoxycholic and taurocholic acid, as there appeared to be a firmer union here with the cholesterol.

As soon as the bile acid content falls below a certain level, the cholesterol is precipitated, with the obvious implication of possible formation of gall-stones. The authors believe that this critical level is reached when the bile salt-cholesterol ratio reaches about the level of 13 and if it falls below this, precipitation will occur. In humans the average bile salt-cholesterol ratio is 20-30, which means that it is dangerously near the critical point.

Theoretically, 2 possibilities of the application to clinical disease may be made: (1) the differential absorption of the 2 substances by the mucosa of the gall-bladder in the process of concentrating the bile; and (2) the excretion by the liver of bile containing so low a proportion of bile salts that they could not hold the cholesterol in solution.

Experimental work by the authors showed that there is no differential absorption of cholesterol and bile salts by the normal gall-bladder. The infected gall-bladder absorbs bile salts rapidly, but cholesterol very slowly, if at all. The bile salt-cholesterol ratio, therefore, is of supreme importance in the precipitation of cholesterol from the bile. The low bile acid content of the cholesterol containing gall-bladder bile from autopsy material is confirmed by the authors and extended to fresh operating room material.

DIAGNOSIS OF STONES IN COMMON BILE DUCT.

It is curious that many medical men still believe that jaundice is almost a necessary sign of gall-stones, whereas, in reality, it is a rare and late sign. R. P. Rowlands (Lancet 1 975 (May 7) 1932) states that only one-fifth of his 666 cases of gall-stones had calculi in the common bile-duct, and by no means all of these had jaundice. Stones may lie in the common bile-duct for years without obstructing enough to cause jaundice—attacks of complete obstruction and colic, if any, being often of short duration. This fallacy too frequently leads to deplorable delay in the diagnosis of gall-stones, and condemns some patients to many years of unnecessary suffering and allows dangerous complications, especially infection and jaundice, to develop.

The diagnosis of stones in the common bile-duct depends chiefly upon the association of repeated attacks of typical biliary colic, with jaundice of an intermittent or remittent type. Rarely is there any enlargement of the gall-bladder, as Courvoisier pointed out many years ago. Occasionally, there may be no colic, this being replaced by intolerable nausea, with faintness and perhaps shivering. Sometimes jaundice is absent because the attacks of obstruction are not long enough to cause it. Here van den Bergh's test for bile-pigment in the blood is of great value. Naunyn pointed out that the duration of jaundice for more than a year is in favor of stone, but the writer has seen jaundice due to carcinoma at the duodenal papilla last nearly 2 years. Shivering, with fever and rigors, complicating jaundice and colic, indicates infective or suppurative cholangitis. These attacks often recur and are very suggestive of stones in

the common bile-duct, but they have too often been attributed to malaria.

Rowlands has known other obstructions of the bile-ducts to be mistaken for gall-stones, *ie* .

- | | |
|-------------------------------|---|
| 1 Organizing blood clot | } In the common bile or common hepatic duct |
| 2 Small hydatid daughter cyst | |
| 3 Round-worm | |
| 4 Papilloma | |
| 5 Papillary carcinoma | |

6 Carcinoma of the common hepatic duct. Here there is no enlargement of the gall-bladder, which makes it resemble stone in the common bile-duct, especially as it often causes severe pain.

7 Carcinoma of the head of the pancreas. Chronic pancreatitis. Hydatid cysts, aneurism, tumors or other things pressing on the common bile-duct. These cause enlargement of the gall-bladder and of the liver.

8 Carcinomata at or near the duodenal papilla or of the ampulla of Vater have all given trouble in diagnosis, but with all of these the jaundice is chronic and rarely remittent. With cirrhosis of the liver the jaundice is continuous, although not severe, and the pain is that of perihepatitis and not typical biliary colic. The history, when not concealed, and the facial appearance may be characteristic of cirrhosis of the liver. The jaundice of carcinoma of the liver, acute yellow atrophy, and other forms of toxic jaundice, have been mistaken for that due to stones in the common bile-duct.

According to E. S. Judd and J. M. Marshall (Arch Surg 23 175 (Aug) 1931), a serious problem ensues for the surgeon and patient when there is involvement of the bile ducts due to the passage of stones from the gall-bladder into the ducts or by the formation of

stones within the ducts themselves. This paper is based on a study of 1608 consecutive cases at the Mayo Clinic in which stones of the common bile duct were removed by operation. In this series there were 1120 women and 488 men. It is interesting to note that the youngest patient was 5 months old, 25 patients were over 60 years of age. The female patients came on an average $5\frac{1}{2}$ years earlier than the males for operation. A complete history of the patient affords the best clue for diagnosis. The chief characteristic of stone in the common duct is the history of intermittent disturbance, even though any one or all of the symptoms may be absent. Inflammatory reaction with edema around the stone as a sequence of irritation of the mucous lining of the duct sooner or later develops, occlusion of the duct occurs, causing biliary obstruction.

Symptoms of sepsis appear if there is infection, and jaundice is present if the obstruction is complete enough. These acute symptoms in most instances last only a few hours or a few days, and then the attack subsides, leaving only a soreness in the right upper abdominal quadrant. Subsequent attacks become more and more frequent, with less complete relief in the intervals. Pain is commonly present and is of the usual colicky type. Eighty per cent of the present series gave a history of one or more attacks of this characteristic pain. Slightly over 17 per cent complained of a dull, boring or aching pain in the epigastrium. Jaundice was present in 1181 (73.4 per cent) of the cases, and in 1105 this was of the intermittent type and paroxysmal. Septic symptoms with chills and fever were present in 597 in the series and were usually associated with the colicky attacks and jaundice.

Nausea and vomiting occurred in 1100 of the cases, while the majority complained of chronic dyspepsia, with belching of gas and distress, in proportion to the amount of fatty acids and coarse vegetables consumed. By the passage of a small soft Rehfuess tube into the duodenum, it can be determined whether or not bile is passing from the duct into the duodenum. When the obstruction is caused by a stone, bile can be recovered in small or larger amounts. The opposite result is seen when there is total obstruction due to stricture or malignancy of the duct or of the pancreas; with the so-called "silent stone," symptoms apparently are absent. Exact diagnosis is sometimes difficult and in such cases cholecystography may be of value, especially if the result be positive.

In 1021 of the 1608 cases, stones were found in both gall-bladder and in the common duct, and in 93 of these patients there had been prior operations performed, most frequently cholecystostomy. In 587, stones were found only in the common duct. In this group 149 had had cholecystectomy performed previously; in the remaining 438 the gall-bladder did not contain stones. It is the practice of the authors to explore the common duct even when stones cannot be felt, provided that it is unduly enlarged and that there is a definite history of chills, fever and jaundice. In the majority of 72 patients, fistula-formation occurred after operation, situated between the gall-bladder and the duodenum. Pancreatitis was present in 420 of the cases.

The technic to be followed in operating for stones in the common duct is outlined. It is necessary to have good exposure of the operative field and the duct should be freed as completely as

possible Even with the greatest care, some stones will be overlooked It is important to provide for prolonged drainage by the insertion of a Deaver T-tube The authors remove the gall-bladder in all cases of stone of the common duct when jaundice is not present or when the operative risk is not materially increased

Postoperative treatment with 1 or 2 liters (quarts) of a 10 per cent solution of dextrose solution intravenously is of value, especially if the patients are jaundiced or if the liver has been considerably injured by the disease The most frequent *postoperative complications* are peritonitis, pneumonia, hemorrhage, hepatic and renal insufficiency The *mortality rate* in the 1608 patients was 6.7 per cent Of those who recovered, the great majority were completely relieved from their symptoms and have remained well

A Klingenstem (Ann Surg 93 1146, 1931) states that stones in the common duct usually result in pain, jaundice, intermittent fever, absence of bile from the stools, bile pigment in the blood serum and urine, and sometimes cholemia This syndrome may vary not only in degree, but in the complete absence of one or another of the diagnostic criteria Thus, pain and jaundice may be lacking Five cases are cited by the author, in none of whom was a common duct stone suspected Exploration showed one or more present in the 5 cases The reported ratios of unsuspected common duct stone being found at operation varies from 1 to 10 per cent Duration of symptoms referable to the gall-bladder does not seem to influence the possibility of common duct stones The common duct should be explored in all cases showing jaundice after attacks of gall-stone colic, or

dilatation of the common duct In spite of the lack of signs and symptoms of a common duct stone, the possibility of its presence should always be borne in mind when removing a calculus-containing gall-bladder

Without Jaundice—Although the presence of jaundice is of great significance in the diagnosis of common duct stone, it is not a constant finding, according to F M Jordan and J F Weir (M Clin North America 15 1529 (May) 1932) In a series of 106 cases of common duct stone at the Mayo Clinic the authors found an absence of jaundice in 13.2 per cent The clinical picture in most of these cases suggested chronic cholecystitis Of the 14 non-jaundiced cases, 7 had had previous gall-tract operations 6 for cholecystectomy and 1 cholecystostomy Dyspepsia and recurrent colic were present in all cases, the average duration of symptoms being 10 years Chills and fever occurred in only 3 cases, as compared with 50 per cent in those associated with jaundice The authors found nothing in these cases to justify a preoperative diagnosis of common duct stone, although it is assumed that if retention of bile occurs transiently during an attack, as demonstrated by serum bilirubin determination, acholic stools or duodenal drainage, common duct stone may be suspected However, jaundice associated with gall-bladder disease without common duct stone may occur, due to associated cholangitis, hepatitis or pancreatitis

Painless Jaundice.—The occurrence of painless jaundice necessitates a differential diagnosis between intrahepatic disease, carcinoma of the head of the pancreas, ampulla or biliary passages, and stone in the common duct In the authors' series 106 cases of common

duct stone painless jaundice occurred in 16. Six of these cases had no pain at any time, 1 developed pain after the onset of jaundice, 6 had no pain for a considerable time previous to the icterus, and in 3 painless jaundice followed biliary tract surgery.

Symptoms were variable and included periodic attacks of nausea and vomiting, prodromal symptoms such as malaise, fatigue, and anorexia, abdominal discomfort, flatulence, nausea, intermittent fever or chills, itching, and acholic stools. The infrequency of chills, fever, leukocytosis and other evidences of infection, suggests the absence of infection as a possible explanation of the lack of pain. According to the authors, it appears that if infection is present, pain or jaundice is more likely to occur, but an etiologic relation is doubtful.

The chief diagnostic difficulty is the differentiation from nonsurgical intrahepatic icterus. The latter condition is usually suggested by the absence of previous dyspepsia or colic in the past, and the history of some predisposing factor such as a respiratory infection; ingestion of alcohol, arsenic or cinchophen; an epidemic of jaundice, the height and type of curve of the serum bilirubin and a free flow of bile by biliary drainage. In carcinoma of the head of the pancreas 2 points of assistance are suggested: (1) the relation of pain to the onset of jaundice, and (2) the absence of bile in the duodenal content and in the stools. "In cases of jaundice of doubtful cause, operation is justified, providing the condition of the patient permits."

COMPLICATIONS — A case of *pancreatic insufficiency* associated with biliary lithiasis in which cholecystectomy was performed is reported by G. Gherardini (Polislinico (sez. med.) 39:347

(July 1) 1932). Digital exploration of the pancreas through the laparotomy incision disclosed a moderate hardening. The extirpated gall-bladder showed no signs of inflammation nor adhesions. Microscopic examination also revealed the complete lack of histopathologic lesions of the inflammatory type. The author maintains that the postoperative behavior of the pancreatic secretion could not have shown oscillations that justify the concept of an automatic regression and functional restitution in the short time between the operation and second period of functional examination, since the patient bore no evidence of cholecystitis and since a hardening of the pancreas does not prove the existence of inflammatory sclerotic lesions. After operation, a notable improvement in the function of the pancreas was observed. The secretory anomalies are explained by a nervous path through which inhibitory stimuli may influence the secretory activity of individual organs and the parenchyma by true or vascular cellular mechanisms. In this case the stimuli came from the calculous gall-bladder, the pathologic reflexogenic center, and led to pancreatic achylia.

Icterus.—P. A. Carné (Bull. méd., Paris 45:913 (Dec. 26) 1931) asserts that biliary lithiasis is a disease that is commonly icterogenic. Jaundice may be present in all the periods of its development, it may assume various clinical aspects and, according to the individual case, present a highly variable prognosis. The author distinguishes premonitory icterus of lithiasis, transitory lithiasis, chronic lithiasis and grave lithiasis:

1 *Premonitory jaundice* of lithiasis appears 10, 15 or 20 years before all other clinical symptoms indicating lith-

iasis, most often in adolescence, sometimes in infancy. It resembles acute apyretic (catarrhal) icterus or common benign infectious jaundice in which the symptoms are not singular. An hereditary tendency is sometimes present. At times the icterus is present during the lithiasis, sometimes it precedes the lithiasis. The biliary calculi should be studied in the early development. One worker (Rowling) finds that the young concretions are formed by a black calcium pigment that is not bilirubin, but a related pigment (bilihumin). Old calculi show that the pigmentary calculus is secondarily infiltrated with cholesterol and the small calculus becomes a large white cholesterol calculus containing traces of the black pigment. Bilihumin is possibly secreted by the liver, precipitated in the intrahepatic bile ducts, and then passes with the bile into the gall-bladder, where the calculi form.

2 Regardless of whether the icterus is abortive or established, the jaundice is of short duration. This is a *transitory* infectious state that complicates lithiasis, with involvement not of the biliary canaliculi, but of the hepatic cells with retention of bile. It is a question of secondary benign infectious icterus. The author believes that there may be in this condition a relationship to acute congestive pancreatitis.

3 *Chronic icterus* is characterized by the retention of biliary calculi in the common bile duct, mechanical obstruction and total or almost total retention of bile. Obstruction of the common bile duct is the first manifestation of lithiasis, but the painful phenomena cannot always be considered symptomatic. Icterus in patients with pancreatic neoplasms is progressive, permanent, and without remissions, on the contrary, the jaundice in lithiasis of the common bile

duct undergoes remissions, which are characterized by attenuation of the cutaneous icterus, return of color and clear urine. Difficulty in diagnosis is sometimes increased when biliary lithiasis is complicated by chronic pancreatitis with characteristics simulating those common to neoplasms of the head of the pancreas. All the various clinical symptoms should be considered in the diagnosis.

4 *Grave icterus* is the termination of the biliary lithiasis. It may appear in the course of obstruction of the bile duct, as a terminal episode of chronic icterus, or in nonobstructive lithiasis of the common bile duct. There are 2 phases, the first occurring as a mechanical consequence of obstruction, the second occurring under the combined influence of stasis and infection.

In considering *treatment*, the author asserts that a slight *catarrhal icterus*, once cured, should not be forgotten, for it can weaken the liver for the entire life and perhaps cause a subsequent biliary lithiasis. The dietary regimen should include cooked fat, eggs, game and alcohol. *Pyretotherapy* is advised during the month following jaundice. *Repetition of transitory lithiasis* with possible infection of the liver should be a sign of alarm and indicate **surgical intervention**. Surgical intervention is also preferable in *chronic lithiasis*. During treatment and observation, the patient should be kept on a **lactovegetarian regimen**; he should be given medicaments such as **sodium salicylate, methenamine and olive oil**. Loss of weight and fever are indications for surgical intervention.

TREATMENT.—Preoperative—I S Ravdin and C G Johnston again emphasize the importance of adequate glycogen reserve of the liver before op-

erative treatment of biliary disease is attempted (Pennsylvania M J 35 357 (Mar) 1932) This is especially true in jaundice Studies of liver tissue in dogs with obstructive jaundice show much better regeneration with adequate supplies of **carbohydrate**. Postoperative administration of carbohydrates is also important In view of the known hepatotoxic action of chloroform and ether, the authors recommend **spinal anesthesia** when possible The use of morphine is generally contraindicated in hepatic disease, since it lowers glycogen reserve

The authors conclude that a functioning, nondiseased gall-bladder should not be removed, since it is an organ with a definite function which should be retained if possible

Indications for Operation in Diseases of Gall-bladder and Bile Ducts.—R P Rowlands (Brit M J 1 643 (Apr 9) 1932) points out the following indications for operation

1 *Obstruction of Cystic Duct*—This is indicated by attacks of biliary colic, with tenderness and rigidity in the right hypochondrium, and often a palpable gall-bladder during or after the attack. Failure to fill the gall-bladder with dye is very strong evidence of obstruction of the cystic duct

2 *Recurrent or Persistent Irritation and Infection of Gall-bladder*—This is indicated by chronic flatulent dyspepsia, pain, and tenderness over the gall-bladder, referred to the lower angle of the right scapula Cholecystographic evidence of the defective filling, concentration, and emptying, or of stones in the gall-bladder, is of great and increasing assistance

3 *Obstruction of Common Bile Duct*—This is evidenced by (1) recurrent attacks of biliary colic with moderate

jaundice (these nearly always indicate calculous obstruction, and it is unfortunate that the x-ray films very rarely show stones in the common duct), and (2) increasing and persistent chronic jaundice with enlargement of the gall-bladder This latter is generally due to chronic pancreatitis, or carcinoma of the head of the pancreas or common bile duct, but is sometimes caused by stone in the duct Here great care must be taken to exclude other causes of jaundice, such as cirrhosis or malignant disease of the liver, acute yellow atrophy, and other forms of toxic jaundice, for which an operation is strongly contraindicated

4 *Stones Without Symptoms*—It ought to be evident that the mere demonstration of gall-stones in the gall-bladder is not a sufficient indication for operation They are very common, and in many they cause no appreciable discomfort, or only such as can be readily relieved by medical treatment, but when symptoms of cholecystitis or of gall-stones recur or persist in spite of medical treatment, it is wise to recommend early operation, in order to prevent a high mortality and other serious consequences of delay. It is well to remember that, in spite of the extravagant claims of quacks, no medical means of dissolving or of evacuating gall-stones are available, although some of these may sometimes pass spontaneously along the ducts, or escape through fistulae into the bowel

Surgical Treatment of Diseases of Gall-bladder.—It is the belief of R P. Rowlands (Brit. M J. 1: 643, p 17 (Apr 9) 1932) that, as a general rule, it is wise not to operate during an acute attack of colic, jaundice, or fever. It is safer to wait for a quiet interval, using the time to carefully investigate and

prepare the patient Later, a more radical operation can be performed safely Fortunately, the acute symptoms usually subside under complete rest and careful medical treatment, for, unlike the appendix, the gall-bladder and bile ducts rarely set up spreading peritonitis It is true that occasionally the acute symptoms do not abate, but become worse and demand emergency operations Usually, these should be limited to drainage of the gall-bladder or common bile duct Radical operations can, if necessary, be carried out later, when the patient is better, the liver functions are restored, and sepsis has subsided It is a great mistake to let many recurrences take place or to allow time for dangerous complications to develop or the general health to become seriously depreciated Too long watching and waiting and relying on drugs and dieting for the relief of symptoms inevitably leads to much suffering and a greatly increased mortality from delayed operation Some of the *consequences of delay* are (1) gangrene, suppuration and perforation of the gall-bladder, with local or even diffuse peritonitis, pylephlebitis, septicemia and multiple arthritis, (2) extension of the disease to the common bile duct with jaundice, infective or suppurative cholangitis, with risks of hemorrhage and cholemia, (3) extension to the pancreas, causing either acute hemorrhage or chronic pancreatitis, with or without jaundice, (4) intestinal obstruction by gall-stones ulcerating through into the duodenum or colon, (5) adenoma, papilloma and cancer from chronic irritation of the gall-bladder and bile ducts; (6) cardiac degeneration from chronic septic absorption (the damaged heart is often restored by removal of a septic gall-bladder), and (7) cerebral toxemia,

from the same causes, which may induce mental confusion, depression and even insanity, which are sometimes overcome by removing the septic source of poisoning

Cholecystostomy affords complete and permanent relief of symptoms in only about 45 per cent of cases The persistence or recurrence of symptoms is often due to stones left behind, to the persistence of inflammation in the walls of the gall-bladder, or to the formation of new stones **Secondary cholecystectomy** or **choledochostomy** is often required **Cholecystectomy** affords complete and permanent relief in about 86 per cent of cases The more accurate the diagnosis and the more complete the operation, the better the result Some temporary recurrence of symptoms may follow cholecystectomy, owing, perhaps, to spasm of the sphincter of Oddi, with dilatation of, and inflammatory changes in, the bile duct secondary to loss of the gall-bladder Under these conditions, spasmodic pains may develop and be attributed to stones left behind in common bile duct In the author's experience, these symptoms are almost limited to late cases in which delay before removal of the gall-bladder has already allowed infection to spread to the common bile duct Cholangitis may then persist or recur, perhaps with exacerbations, even after drainage of the common bile duct, as well as after the removal of the gall-bladder Medical treatment will generally cure these symptoms and should be well tried before the patient is submitted to another operation, which may not disclose any stone or obstruction in the bile ducts *Recurrence of symptoms* after operation may be due to residual infection in the liver or pancreas, to stones overlooked in the ducts, to errors in diagnosis, *i e*, overlooking

osteoarthritis of the spine, or to spastic or mucous colitis

Cholecystectomy is given first place in the treatment in the therapy of *calculous cholecystitis* by M G Bachy (Rev de chir, Paris 51 229 (Apr) 1932) The necessity of **draining the common bile duct**, especially when there is *concomitant pancreatitis*, is insisted on and the danger of pancreatitis is stressed **Cholecystectomy** should be performed from the neck toward the bottom, but the cystic duct should not be removed if postoperative complications are to be avoided The author states that it is necessary to leave one cigarette drain in contact with the stirrup of cystic duct Bachy considers **cholecystostomy** an easy and safe operation and ranks it second among therapeutic measures in *biliary lithiasis*

E Leo (Arch ital di chir. 30:655 (Dec) 1931) describes a preferred method of **cholecystectomy** and criticizes the various methods of cholecystectomy, with and without drainage, subserous and otherwise He attacks vigorously subserous cholecystectomy, giving his reasons for opposing it, and describes his own method of total cholecystectomy, without drainage, characterized by a new treatment of the gall-bladder stump, which is covered with a pedunculated flap of the peritoneum of the gall-bladder itself, or of the hepatic recess, to which peritonization, hemostasis and bilio-stasis by means of a special suture is applied

R P Rowlands also points out that operations upon the common bile duct are much safer when undertaken in the quiet period, but when colic and jaundice continue indefinitely without remission, it is necessary to operate without waiting too long for a quiet period, before the patient has wasted unduly

and has become unusually liable to bleed or to become comatose after operation Occasionally a stone firmly impacted in the common bile duct causes sloughing and perforation of the duct, with local or even diffuse peritonitis When the cause of chronic jaundice is uncertain, it is generally wise to explore, and the author has often been rewarded in such cases by finding one or more stones in the common bile duct Moreover, if not stone, but some irremovable cause of obstruction is found, a **cholecystogastrostomy** can be made to overcome the jaundice and the intolerable itching and anorexia which make the patient so unhappy and always shorten his life. It is rarely wise to allow many repetitions of biliary colic with jaundice, although it may be reasonable not to operate after the first attack in the hope that the only stone has passed and that no more may develop After every fresh attack, spontaneous cure becomes more and more improbable, because common duct stones inevitably and often rapidly increase in size and become naturally more difficult to pass through the duodenal orifice of the duct, which is only $\frac{1}{16}$ inch (0.21 cm.) in diameter Moreover, more or less septic infection of the ducts and liver frequently follows and leads to serious loss of liver function, with marked increase of the mortality after delayed operation.

The use of **graded surgery** in the treatment of *gall-stones* in the common bile duct is stressed by H. M Clute (New England J Med. 205: 563 (Sept 17) 1931). The author points out that in operating upon a patient with gall-stones in the gall-bladder and stones in the common duct, it is the natural desire of the surgeon to remove the gall-bladder as the focus in which the gall-stones probably arose and also to open

the common duct, remove the obstructing material, and drain it. In patients who are thin, and in whom the approach to the gall-bladder and the duct is readily made, such a procedure can frequently be carried out with dispatch and ease. The writer believes, however, that in the older, poor-risk patients with biliary tract obstruction and infection, the addition of cholecystectomy to the

mitted that such a possibility is present and in fact this did occur in one case reported by the author.

The operation must be predicated on the principle that the major difficulty from which the patient is suffering is an obstruction to the common duct. A type of anesthesia which adds no appreciable strain to the excretory functions of liver and kidney must be used,



Fig 1—Removal of stones from common bile duct and gall-bladder
(H M Clute New Eng J Med 205 563 (Sept 17) 1931)

relief of common duct obstruction, even though the procedure is technically simple, may well add to the smoothness of convalescence and freedom from complications. Objection to simple drainage of the gall-bladder and removal of the stones in such a patient may well be made on the grounds that stones may be overlooked or new stones may form in the infected viscus, which will later enter the common duct and cause further serious obstruction. It is ad-

and novocaine, either by spinal or by regional anesthesia, best fulfills these requirements. An incision is made in the right upper abdomen, a small pack is at once introduced over the duodenum and the duodenum retracted toward the midline. Allis or Babcock forceps are placed upon the gall-bladder and gentle upward traction is made. By these procedures, the course and outline of the common duct can usually be distinguished at once. A short incision in

the common duct is now made and with suction the retained bile and detritus are removed. The obstructing stones are extracted with appropriate stone forceps and careful investigation of the course of the duct is carried out to make certain that all stones are removed. Irrigation with a catheter and the passage of sounds into the duodenum con-

removed. Careful palpation inside and outside the gall-bladder reveals whether the viscus is entirely emptied. A rubber tube is inserted into the gall-bladder, a short arm T-tube is placed in the common duct, a cigarette diam in the kidney pouch beneath the common duct, and the abdomen is closed in layers.

The value of anastomotic opera-



Fig 2—Tubes placed in gall-bladder and common bile duct after removal of stones
(H M Clute New Eng J Med 205 563 (Sept 17) 1931)

stitute a most convenient method for this purpose. A procedure such as that described should take but, relatively, a few minutes.

Attention may now be directed to the gall-bladder. If the patient's condition is very serious, the writer believes that the gall-bladder and its contained stones, if it has any, may be left strictly alone. On the other hand, if the patient's condition seems to warrant it, an incision is made in the gall-bladder and the stones

removed. Careful palpation inside and outside the gall-bladder reveals whether the viscus is entirely emptied. A rubber tube is inserted into the gall-bladder, a short arm T-tube is placed in the common duct, a cigarette diam in the kidney pouch beneath the common duct, and the abdomen is closed in layers. The value of anastomotic opera-

tions in surgery of the biliary tract is discussed by S de Dziembowski (Bull et. mém Soc d chirurgiens de Paris 23 545 (July 3) 1931). In 1924, the author reported 8 cases of complications of *biliary lithiasis*—dilatation of the bile ducts, constriction of the lower part of the common duct, and constriction of the papilla of Vater—in which he made an anastomosis between the biliary and gastrointestinal tract. The immediate and late results in these

cases were encouraging, but as an especially striking example of the advantages of the method, he cites a case which he operated upon several months ago. The patient was a woman 28 years of age who was suffering from gall-stones with severe colic. For 1 week an attack had persisted in spite of several injections of morphine and pantopon. As the patient was threatened with septic angiocholitis, operation was decided upon. In the separation of adhesions previous to removal of the gall-bladder, a choledochoduodenal fistula of recent formation was discovered. The fistula was filled with a necrotic substance which was easily removed. This substance was found to be the detached vesicular mucosa with its entire contents. There were no stones in the ducts. The operation was completed by reconstructing the choledochoduodenal fistula which had been accidentally resected. Excellent post-operative recovery followed. The patient remains in splendid condition to date.

The spontaneous fistula in this case permitted evacuation of the pathological contents of the biliary tract. Naunyn emphasized the necessity of such a spontaneous fistula for spontaneous recovery. As a rule, spontaneous recovery does not occur after spontaneous fistulae forming between other parts of the biliary and digestive tracts, such as between the biliary tract and the colon. The author believes that the good result in his case was due to the reconstruction of the spontaneous fistula.

It is well known that constriction of the lower part of the common duct may cause serious trouble at operation. In the presence of such a constriction, choledochotomy with drainage of the hepatic duct will not give a lasting cure,

even though complete evacuation of pathological material is achieved.

As spontaneous fistulization gives good results, it would seem logical to conclude that an artificially produced fistula might give equally good results. However, the question arises whether an anastomosis between the biliary tract and the intestine might not favor the access of intestinal bacteria to the biliary tract. The author emphasizes the fact that the anastomosis is made to the duodenum, which is relatively sterile, and never to the lower parts of the small intestine or to the colon. Kehr recognized the value of this method and recommended anastomosis by suture, rather than by the use of the Murphy button. He also emphasized the importance of making the anastomosis high enough up in the intestine or to the stomach. The disadvantages of the operation, according to the older surgeons, were post-operative dilatation of the ducts, hypertrophy of the walls of the biliary tract, and especially of the mucosa of the glands, an inflammatory hypertrophic condition of the lymphatic tissue in the walls, and the presence of bacteria in the biliary tract and even in the capillary bile ducts of the liver. However, Kehr attributed such infections to biliary stasis rather than to the anastomosis. Good results were obtained formerly only in cases of biliary lithiasis and not in cases in which obstruction was due to tumor. Cases successfully operated upon by this method have been reported by Anschuetz, Miller, Garré, Lameris, Doberauer and Gohrbandt. Finsterer performed the operation in 48 cases, with only 2 fatalities, which he attributed to faulty technic. Post-operative drainage of the abdominal cavity, and especially of the region operated upon, is indispensable. In Fin-

sterer's 2 fatal cases it had not been sufficient. Finsterer believes that infection of the biliary tract in these cases is due not to the anastomosis, but to stasis. Because of the possible presence of hepatic lesions, general anesthesia is contraindicated. Of 22 patients operated upon by Finsterer from 3 to 7 years ago, 19 are completely cured. Three still have symptoms, but these are due to gastric ulcer. Floercken performed the operation in 28 cases and obtained a cure in 90 per cent. Sasse obtained a complete cure in all of 11 cases operated upon from 8 to 10 years ago. Bayer obtained good immediate and late results in 57 cases. Walters believes that the use of the Murphy button is an aid in checking postoperative hemorrhage.

It is important to keep in mind the fact that artificial anastomoses will close up if the natural route regains its permeability. Therefore, anastomosis should not be practiced indiscriminately in preference to drainage. As it will rob the biliary tract of the protective mechanism of the papilla of Vater, it should be done only when it is clearly indicated. According to Wildegans, choledochoduodenostomy should be used only in cases of obstinate stenosis of the common duct which cannot be treated in any other way. In cases of stone in the papilla of Vater, it should be used only when the patient is too feeble to withstand a radical operation.

The operation is indicated in cases in which there is a constriction of the lower part of the common duct or of the papilla. In such cases it should be substituted for drainage, because drainage is frequently followed by recurrence and by symptoms due to constriction, insufficient permeability of the common duct, or persistence of the

drainage fistula. Choledochoduodenostomy is often very useful and efficacious in constrictions due to tumors or induration of the pancreas. In cases of malignancy it gives temporary amelioration lasting for about $1\frac{1}{2}$ years.

De Dziembowski (*loc cit*) has made an anastomosis between the biliary and digestive tracts in 23 cases. In 6, the anastomosis was between the gall-bladder and the duodenum, and in the rest between the common duct and the duodenum. Cholecystoduodenostomy was used in cases of *malignant tumor* which could not be removed. In 3 cases the patients developed symptoms of heart failure and hypotension shortly after the operation, as the shock of the intervention proved to be too great. The anastomosis was done under local anesthesia in one stage and by the suture method. Perhaps the Murphy button and a two-stage operation might have given better chances of recovery. In 2 cases the "white bile," considered a sign of poor resistance, was present. The author believes that the only operation to be recommended for such cases is cholecystostomy with secondary anastomosis. When anastomosis is done first, the result will be only temporary. In 3 such cases autopsy showed that the impermeability of the anastomosis was due to rapid extension of the tumor, and in 1 case to cicatricial constriction of the sutured parts. In the 17 cases in which choledochoduodenostomy was done for biliary lithiasis, better results were obtained than could have been expected from any other method. The anastomosis was accomplished in these cases without any tension between the supraduodenal portion of the common duct and the duodenum.

A wide longitudinal incision and the suture method were used. By means of

the wide incision a wide anastomosis was obtained. Clamps were never used, especially not on the common duct. In almost all cases an exact approximation of the 2 surfaces was obtained. In some cases the author added a pedicled omental flap. In all cases the peritoneum was drained. There were no deaths which could be attributed to the operation. The 2 deaths in the series were due to the cardiorenal and pulmonary complications. In 1 case there was such marked necrosis of the common duct that it was necessary to choose between a choledochoplastic operation and an anastomosis. The author used the latter and obtained an excellent result with the use of a pedicled omental flap. In 8 cases there was a constriction in the lower part of the common duct near the papilla of Vater due to cicatrices from biliary lithiasis. In 2 cases this portion of the common duct was obliterated as the result of an inflammatory tumor of the head of the pancreas. In these 10 cases examination revealed a marked dilatation of the ducts, especially of the common duct, and hypertrophic thickening of the walls of the biliary tract. All of the patients were followed for more than 2 years. Anastomosis is never done by the author when the common duct is permeable.

In cases of *stenosis due to stones* or *inflammation*, choledochoduodenostomy gives the best results. Of the cases in which other surgeons performed choledochotomy with drainage, the late results are unsatisfactory in about 50 per cent.

A method of plastic reconstruction of the common bile duct is described by V L Schrager, A C Ivy and J E Morgan (Surg Gynec Obst 54 613 (Apr) 1932). A viable tube from 1 to 2 inches (2.5 to 5 cm.) long is made

from a flap of pyloric mucosa. This tube may be anastomosed either to the gall-bladder or to a biliary duct. The gastric orifice of the tube is constructed to prevent regurgitation. The authors have performed the operation successfully in a number of dogs without post-operative complications appearing within a period of from 2 to 3 months.

The ligation of the hepatic artery and grafting of its terminal head into the portal vein was reported by V Ghiron and A Brunacci (Ann ital di chir 10 1365 (Dec 31) 1931). The authors comment on the successful results of their experimental research on dogs. Such an intervention might be advisable in cases of irremediable lesion of the hepatic artery to prevent necrosis of the hepatic tissue. The authors cite also published cases of various lesions of the hepatic artery in man.

Obstructive Jaundice.—Surgical Treatment—H M Clute (Surg Clin North America 12 565 (June) 1932) states that in the young, obstructive jaundice is caused most frequently by infectious cholangitis, in adults, by stones in the common duct, in old persons, by cancer, and in persons previously operated upon for biliary disease, by stricture of the common duct. Obstructive jaundice causes physiological disturbances in the liver, alterations in kidney function, and disturbances of the blood-clotting power.

Successful treatment of obstructive jaundice depends upon adequate estimations of liver, kidney, and blood function. Liver function is determined most satisfactorily by daily estimations of the bilirubin content of the blood and repeated urobilinogen tests, kidney function, by daily estimations of the nonprotein nitrogen of the blood, and the tendency to bleed, by the Linton

test of the sedimentation rate of the red blood cells

Preparation for operation must include an adequate fluid, salt, and glucose intake. These prepare the liver, kidney and blood adequately. In severe cases, transfusions of whole blood are advisable. The intravenous administration of calcium has been abandoned.

Operation is best performed under spinal anesthesia. Before any operation on the common duct or gall-bladder, the biliary tract should be carefully explored. The author believes that stones in the common duct can be ruled out with practical certainty if a soft rubber catheter enters the duodenum readily, and if fluid flows into the intestines readily and without washing out stone fragments. In the cases of seriously jaundiced patients, relief of the obstruction is the most important consideration, and, therefore, a two-stage operation may be best. When the presence of malignancy is questionable, the gall-bladder should not be removed. If stricture of the common duct is found, direct anastomosis to the duodenum is the procedure of choice. End-to-end anastomosis of the bile duct is least successful.

The most serious *postoperative complication* is *liver shock*, which is characterized clinically by severe depression of all bodily functions. The treatment of this condition consists in the intravenous administration of saline solution, glucose, adrenalin, and stimulants. *Kidney failure* is best treated by the intravenous administration of glucose and salt solution. Frequently 200 c.c. (6 $\frac{2}{3}$ ounces) of a 20 per cent. glucose solution given intravenously will stimulate kidney secretion immediately. When the slightest indication of postoperative hemorrhage is noted,

direct transfusions should be begun at once.

If the jaundice fails to clear up after drainage of the common duct, a stone may have been overlooked, the T-tube may have become kinked, or cholangitis may be present. In some cases x-ray examination, after the injection of lipiodol into the tube, may reveal the cause. The T-tube may be removed from 8 to 90 days after the operation, depending upon the pathological changes found at operation.

RESULTS AND MORTALITY IN BILIARY SURGERY.—F. G. Connell (Ann Surg 94 363 (Sept) 1931) states that the fatal high temperature reaction following biliary tract surgery appears to be a definite clinical entity. Seventeen such cases occurring in 72 deaths after biliary tract operations are analyzed. It would seem rational to consider the syndrome as a metabolic, chemical or allergic reaction or due to a nervous phenomenon, the exact nature of which is unknown. Instances of spontaneous recovery (what might be termed abortive) do occur but present no characteristic features differentiating them from the fatal cases. Treatment, in the absence of etiologic factors, is symptomatic. Therapeutic efforts in the "abortive" cases fail to give a clue to effective treatment. A review of postoperative records in laparotomies for conditions other than biliary tract disease failed to show similar temperature reactions. Further study, it is hoped, will clear up the subject and develop an effective therapy.

From a study of the symptomatic and end-results of operations in 153 cases of *cholecystitis*, J. C. Ross (Brit. M. J. 1. 1026 (June 4) 1932) concludes that complete cure may be expected in 82.4 per cent. Of the rest, 10.5 per cent are

relieved, while 70.1 per cent remain in *statu quo*. The symptoms of flatulent dyspepsia, including qualitative anorexia, completely disappear in more than 80 per cent of cases. It would appear that the absence of stones renders the prospect of cure perceptibly less. However, in cases of acute cholecystitis the absence of stones has no effect whatever on the prospect of cure. The operative mortality varies between 2 and 6 per cent, depending to a large extent on the type of case dealt with. In the author's series, dealing with every type of case, the mortality was 5.8 per cent. The average period of convalescence before full work is resumed is 13 weeks.

To determine the primary and end-results of surgical treatment of *gall-stone disease*, S. Kjaergaard (Acta chir Scandinav 69:401, 1932) has reviewed some recent Scandinavian statistics. In his own material, which includes 190 cases, the mortality was 7.9 per cent. If operations for recurrences and cancer complications are excluded, it was 6 per cent. In the cases of patients under 40 and 50 years of age, it was 3.5 per cent, and in those of patients over 50 years of age, it was 20 per cent. In 62 cases in which choledochotomy was done the mortality was 12.9 per cent and in 122 cases treated by cholecystectomy, exclusive of 2 cases of perforation with peritonitis and 1 case with cancer complications, it was 2.4 per cent.

During acute cholecystitis, the danger of expectant treatment is relatively slight. In older cases less suitable for operation, the danger is considered less than that of surgical treatment.

Of 173 patients followed, 13 are dead. Of the surviving 160, 70.6 per cent have a fully satisfactory result, 20.6 per cent have mild complications

and 8.8 per cent have more severe complications. The corresponding figures for patients treated by choledocholithotomy are 66.7 per cent, 16.7 per cent, and 16.6 per cent.

The author disapproves of primary closure without drainage.

In cases of *gall-bladder stasis* and *adhesive pericholecystitis without calculi* the end-results are less satisfactory. In such cases a search should be made for predisposing conditions.

The author discusses the indications for operation in the various forms of gall-stone disease. The increased mortality in patients past the age of 45 years necessitates special care in looking for contraindications in such patients.

A study of 130 patients admitted to the Temple University Hospital, Philadelphia, in the last 13 months on the surgical service of W. Wayne Babcock and his associates is reported by G. W. Pratt (personal communication). Of this number, 120 have come to operation, 45 being in the terminal stage of *cholecystitis*, a percentage of 23.4. Of the 45 cases of *gangrenous* or *purulent cholecystitis*, 40 were operated upon within 24 hours after admission to the surgical service.

Five were studied or prepared from 1 to 5 days before operation. Thirty-five of the patients recovered and 10 died, a mortality rate of 22.2 per cent. Twenty-three (52 per cent) of the cases in which *cholecystectomy* was performed all recovered. Twenty-two patients had *cholecystostomy* and of these 10 died, a mortality for *cholecystostomy* of 45.5 per cent. This mortality, while alarmingly high, is not as significant as it appears at first. The patients in the more serious conditions were selected for *cholecystostomy*. In a summary of the deaths, 60 per cent died of peri-

tonitis, 10 per cent of uremia, and 20 per cent of cardiac complications. As to age, 60 per cent of deaths occurred in patients between 60 and 70 years of age.

The relation between the years of attacks and mortality shows that mortality rises with the number of years of attacks, whereas in operations on patients with a history of less than 1 year of colic, only 10 per cent died, in patients with a history of attacks for 8 years, 50 per cent died.

The author shows that the practice of holding the patient at home or in the hospital, either for further study or for localization, will reflect in mortality. It is significant that in the series of 45 purulent gall-bladders, with the exception of 1 cardiac accident, no death occurred where the operation was performed within 9 days of the onset of the terminal attack, despite the fact that cholecystectomy was performed in over half of the cases.

G. W. Pratt quotes E. S. Judd (J. A. M. A. 99:887 (Sept. 10) 1932) in giving his mortality in clean operations on the gall-bladder at the Mayo Clinic, as 17 per cent and a gross Mayo mortality of 28 per cent in 16,980 cases. Lahey, at Boston, has a mortality of 22 per cent. The results published by the Mayo Clinic this year on their follow-up work on biliary disease showed that good results were obtained in 85 per cent of the cases after *cholecystectomy*. There was a cure in less than 60 per cent of the cases after *cholecystostomy*. This was true whether there were stones present or not. This is in line with the findings of Pratt at the Temple University Hospital, as 4, or 18 per cent., of the 22 cholecystostomies have returned in less than a year for treatment of their previous condition.

In the future, it is believed that the trend will be more and more to earlier and more thorough surgery and perhaps the gradual decrease in the percentage of the terminal stage of gall-bladder disease with its high mortality and resultant damage to the parenchymatous organs.

In an effort to evaluate the results of surgery in the biliary tract E. S. Judd and J. P. Priestley (J. A. M. A. 99:887 (Sept. 10) 1932) recently reviewed the data on 606 cases on whom follow-up information was available. Cholelithiasis was present in 534, cholecystitis without stone, in 72 cases. The results are summarized in Tables III and IV.

No cases of recurrent lithiasis were observed following cholecystectomy and choledochostomy, while there was recurrence of symptoms demanding further surgery in 69 per cent. of cases having cholecystostomy and choledochostomy. The authors believe that in the absence of a gall-bladder, stones rarely are formed. Of the cases needing reoperation, stones were present in about 50 per cent. The interim between operation and recurrence was more than 10 years in more than half of the cases.

Judging from these findings, the results of cholecystectomy are far superior to cholecystostomy unless definite contraindications to the former operation are present.

J. T. Mason and J. M. Blackford (J. A. M. A. 99:891 (Sept. 10) 1932) comment on the reduced operative mortality in gall-bladder surgery from 6 to less than 2 per cent., due to recent knowledge concerning biliary function. The importance of building up glycogen reserve has been definitely established.

A series of 600 cases were reviewed by these authors. All had "well defined chronic cholecystitis." Only 185 per

TABLE III
CHOLECYSTITIS WITH CHOLELITHIASIS, RESULTS MORE THAN 20 YEARS AFTER
OPERATION (534 CASES)

Operation	Cases	Per Cent		
		Satisfactory	Unsatisfactory	Reoperation
Cholecystostomy	376	58.6	24.4	17.0
Cholecystectomy	100	83.0	17.0	0
Choledochostomy and cholecystostomy	43	76.8	16.3	6.9
Choledochostomy with or without cholecystectomy	15	86.6	13.4	0

TABLE IV
CHOLECYSTITIS WITHOUT CHOLELITHIASIS, RESULTS MORE THAN 20 YEARS
AFTER OPERATION (72 CASES)

Operation	Cases	Per Cent		
		Satisfactory	Unsatisfactory	Reoperation
Cholecystostomy	50	62.0	26.0	12.0
Cholecystectomy	21	85.7	14.3	0
Cholecystostomy and choledochostomy	1	100.0	0	0

cent gave a history of acute colic. Three-fourths of the patients sought relief from chronic gastric disorders, and in over half of these the symptoms had existed for more than 10 years. All patients were subjected to cholecystectomy from 5 to 15 years ago, all were uncomplicated by empyema, jaundice, acute cholecystitis, or carcinoma. Eighty-three per cent reported 75 per cent relief, 56 per cent of cases reported complete relief; 13 per cent continued to have symptoms as before; and 4 per cent had no relief.

Two hundred cases refusing operation and treated medically were followed up after an average of $9\frac{1}{2}$ years. Medical measures included dietary restriction, administration of a morning saline, bile salts before meals and recently combined with oleic acid; and relief of constipation. Biliary drainage

was not used. One-third of these patients became symptom-free; one-third came to operation, and in the remaining third, symptoms were unrelieved. The authors conclude that operative results are best in those patients not relieved by medical treatment. Cases with disturbed gastric secretion and advanced changes of the liver and biliary ducts cannot expect as complete relief from operation as early cases.

Effect of Cholecystectomy.—According to F. W. Cox (Surg. Gynec. and Obst. 55:168 (Aug.) 1932), Beale, in 1856, named the small accessory pouches lining the biliary tract "parietal saccules" and believed they were capable of concentrating bile. Sweet, in 1924, also concluded that these pouches were capable of concentrating bile following cholecystectomy. Judd, in 1923, expressed the belief that there is no com-

compensatory change following cholecystectomy other than dilatation of the extra-hepatic ducts, a view which Cox believes is supported by Graham-Cole tests on cholecystectomized patients

After careful histologic studies on material obtained at autopsy and in animals following experimental surgery, Cox concludes that there is no compensatory change in the mucosa of the ducts except that due to pressure

CARCINOMA OF GALL-BLADDER—H J Shelley and L I Ross (Arch Surg 25 65 (July) 1932) have reviewed the literature of carcinoma of the gall-bladder and conclude that the condition is of more academic than practical importance, since the only cases diagnosed early enough to be benefited by surgery are those in which the malignancy is discovered accidentally during operations for other causes. The disease is more frequent in females in the ratio of about 2:1. The gall-bladder stands in fifth place in order of frequency of carcinoma of digestive organs, being preceded by the stomach, colon, rectum and esophagus. Grossly the tumors may be villous, papillomatous, or fungating, gelatinous, diffuse, flat, or infiltrating. According to Ewing, the following factors favor malignancy in the gall-bladder: (1) mechanical irritation of calculi, (2) catarrhal inflammation that excites a cellular overgrowth; (3) the relation to a peculiar form of lipid metabolism, and (4) irritative and digestive action of bile. Estimates of the frequency of carcinoma in gall-stone disease vary from 7 to 14 per cent.

In 19 cases reported by the authors, 5 gave histories of typical gall-stone colic, 2 had milder but more continuous pain in the upper right quadrant referred to the shoulder, and 2 had chills and fever. Jaundice was present in 8,

pain in 8, and palpable tumor in 9. Weight loss was noted in 8 cases. Ascites was present in 2 cases. Laboratory examinations aided little in diagnosis. Failure of the gall-bladder to visualize by cholecystography is common, but occasionally the tumor may be outlined. Treatment is early surgery. However, most cases come to operation too late to be aided. In the authors' series, 1 patient is living and well at 6½ years.

RUPTURE—A case of total traumatic rupture of the choledochus is described by B Quarella (Boll e mem. Soc piemontese d chir 1 1193 (Dec 19) 1931). An external fistula resulted. Nine months following the accident, a cholecystogastrostomy was performed followed by almost complete closure of the external fistula in 1 week. The weight loss from the bile fistula was 61 pounds, in a few months following operation the patient had regained 26 pounds.

BILIARY INFECTION AND ARTHRITIS.—E F Hartung and O Steinbrocker (Am. J. M. Sc 184 711 (Nov) 1932) have reviewed 200 cases of chronic rheumatic disease in an attempt to determine the frequency and importance of gall-bladder infection in this group. All patients were studied carefully historically. If any suggestion of biliary tract disease was obtained, further studies, which included x-ray, duodenal drainage and blood chemistry, were carried out. Thirty patients were studied by cholecystography. Of this group 25 were apparently normal and 5 were considered diseased. Of the 25 negative cases, 4 showed evidence of disease by drainage. In all, 9 cases were considered to have gall-bladder disease, an incidence of 4.5 per cent. Judging from available figures, this incidence is no higher than

in any large group of hospital admissions "In no case was cholecystitis seen to be a definite factor in etiology "

BISMUTH.—UNTOWARD EFFECTS.—E A Skolnik and I Ale-shire (J A M A 98 1798 (May 21) 1932) report 22 cases of a bismuth *skin eruption* following the intramuscular injection of bismuth. The diagnosis was established in most of the patients by development of the eruption during the administration of bismuth, subsidence of the rash on discontinuing the drug and recurrence of the lesions on readministering bismuth. In all the cases reported the eruptions that developed as a manifestation of bismuth sensitivity had never previously appeared in these patients. Since the eruptions in this series were so benign and resembled some of the usual skin diseases, the condition was reproduced a second or even a third time to prove the etiologic rôle of the bismuth. Thirteen of the cases were tested and proved in this fashion. The acute types of rash produced were the urticarial, folliculopapular, exfoliative, and the erythematosquamous, which resembled pityriasis rosea. The chronic types were the lichen planus-like and the chronic lichenified form, simulating lichen simplex chronicus. By far the greater number, 14, were in the pityriasis rosea-like group. Reactions occurred with all the preparations used, which were an oil suspension of potassium bismuth tartrate, an aqueous solution of bismuth sodium tartrate, and an oil suspension of bismuth salicylate. The eruption was reproduced in several instances by a different preparation of bismuth, indicating that the sensitization was to bismuth alone.

The development of a large subcutaneous *abscess* following antisyphilitic

treatments by means of intragluteal injections of bismuth and of sulphur preparations was reported by H Schaer (Schweiz med Wchnschr 62 280 (Mar 19) 1932). Puncture of the abscess yielded a brown fluid in which bismuth could be detected but no sulphur. Bacteriologic examination of a smear, as well as the culture and the animal experiment, all gave negative results. The author also cites several cases in the literature of late abscess after bismuth injections.

BLADDER.—TUMORS.—There has been no more interesting development in urology than the modern treatment of bladder neoplasms. Their diagnosis is today relatively easy. As to whether they are benign or malignant rests, of course, with the final pathological diagnosis. Some men do not believe in biopsy preceding treatment; others say there is no harm in biopsy. The diagnosis is always made by the cystoscope.

An unusual case of *malignant tumor* in a diverticulum of the urinary bladder, is reported by H L Stewart and G J Muellerschoen (J Urol 27 685 (June) 1932), this being the twenty-sixth case in the literature. The case was discovered at autopsy.

R Chwalla (Urol and Cutan Rev 36 381 (June) 1932) reports a case of *amyloid tumor* at the bladder neck and in the posterior urethra which was diagnosed as a benign papilloma cystoscopically.

Treatment—In a review of 98 cases of *cancer* of the bladder diagnosed on pathological observations, B S Barringer (Surg Gynec Obst 55 487 (Oct) 1932) reports his treatment with radium and feels that the suprapubic method of approach is the one of

choice because of the ease with which the tumor can be exposed and the definite manner in which the radium can be applied. If the tumor is papillary, the papillary portions are removed by some form of cautery so as to expose the tumor base. Patients agreeing to the method of treatment as outlined, as a rule, do not have any radium reaction for 10 days or 2 weeks. The larger the radium dose and the nearer the tumor to the bladder neck, the greater the reaction. In his series there were 2 cases where subsequently it was necessary to operate upon and drain the kidney. In a number of cases, stone and gravel formed on the slough of the tumor, necessitating the opening of the bladder for removal of the stones and 2 cases of rupture of the bladder were also observed.

F. H. Redewill (Urol and Cutan Rev 36 145 (Mar) 1932) uses the Broders' method of classifying bladder tumors and the trypan blue dye to classify the tumors without biopsy. He is opposed to the open cystotomy and attempts to treat all tumors through the cystoscope. He uses diathermy, coagulation and desiccation, and offers a new electrode with which to treat heretofore inaccessible tumors at the bladder neck.

A. Hyman (Urol and Cutan Rev. 36 174 (Mar) 1932) fulgurates the tumors and then applies radon seeds through the cystoscope. There are certain selected cases of bladder malignancy which have responded to the cystoscopic application of radium. The seeds found to be the most satisfactory have been those of radon in platinum or gold.

In a study of 250 cases, W. H. Haines (Urol and Cutan Rev 36: 178 (Mar) 1932) states that 5 years

ago he was very optimistic regarding the conservative treatment of bladder tumors. He has now become very radical and believes that total cystectomy, despite its high mortality, is preferable to the slow, irresistible, torturous, agonizing death. He has discarded the use of radium. In either instance, he believes it has aggravated the clinical picture and hastened death. The use of diathermy by way of cystotomy is advised in *uncontrolled hemorrhage* of bladder tumors. Deep x-ray therapy may be used as a preventive against metastasis. In the experience of the writer x-ray treatment has not relieved pain. This view is so diametrically opposite to that of most other workers with bladder tumors that it must be commented upon. It may be that Haines has seen more of the terminal carcinomas of the bladder than other writers.

The diagnosis can only be made by cystoscope, the successful treatment must consist in a clinical classification of the tumor and be based upon the experience, not only of one man but of many men working along these same lines. The terminal cases, naturally, are not going to be benefited by any form of therapy but the conservative treatment with diathermy, coagulation, x-ray, and radium, with or without surgery, and in the early diagnosed tumor of the bladder, is certainly going to prevent, in a vast majority of cases, the later total cystectomy with transplantation of ureters.

A *myxosarcoma* of the bladder was observed by J. A. Lazarus and A. A. Rosenthal (J Urol. 27:695 (June) 1932) in a child 2 years of age. Because of its rapid metastasis, total cystectomy seems to be the procedure which offers the greatest possibility of

cure in these cases This opinion is agreed upon by J Gabe (Brit J Urol 4 145 (June) 1932) who reports a case of *sarcosarcoma* of the urinary bladder in which, following cystotomy and biopsy, the patient died In reviewing the literature, the author agrees with the preceding writer that total cystectomy is the only chance of cure.

A case of *leiomyosarcoma* of the bladder is reported by Powell (Brit J Urol 4 259 (Sept) 1932) for which a large bladder resection was done Six months later the patient died and autopsy showed no metastases excepting to the abdominal wall, although there was a recurrence around the scar of the old operation with bilateral pyelonephritis

G E Pfahler (Surg Gynec Obst 53 680 (Nov) 1931) is extremely enthusiastic concerning the results obtained by x-rays and radium in the diagnosis and treatment of carcinoma of the bladder He believes that it is possible by pneumocystography to determine the present size, outline, position and amount of infiltration of bladder carcinoma He believes that **electro-coagulation** is always better than excision, followed by radium or x-ray therapy He obtained some very encouraging results by irradiation and believes that they will be more and more permanent and the percentage of cures greatly increased, if in the early stages the growths can be destroyed cystoscopically and then treated by radium and deep x-ray therapy

RUPTURE.—Rupture of the urinary bladder is rather a rare condition Horine (Urol and Cutan Rev. 36 448 (July) 1932) reports a case of intraperitoneal perforation of bladder ulcer which caused death, while Crane and Schenck (Urol and Cutan Rev. 36 614

(Sept) 1932) make a clinical study of 26 cases of rupture of the urinary bladder They attribute the increasing frequency of this condition to the modern methods of transportation and accidents incident thereto The *treatment*, of course, is free bladder **drainage** usually by the suprapubic route The *prognosis* in the case of extraperitoneal rupture is 50 per cent better than where the rupture is intraperitoneal

FOREIGN BODIES—Two interesting cases appeared in the literature during the last year In one case, a *hair-pin* was removed from the bladder of a 4-year-old child with an improvised instrument and is reported by Kembrough (J Urol 28 251 (Aug) 1932) In the other case, which was observed by Crance (Urol and Cutan. Rev 36 436 (July) 1932), a stone, which had formed upon a button and measured $\frac{3}{4}$ of an inch in diameter, was removed from the bladder This object had been inserted through the urethra

BLOOD DYSCRASIAS.—Certain blood pictures have appeared following intravenous medication, and the etiological relationship, therefore, between such drugs as arsphenamines and blood dyscrasias is paramount According to F P McCarthy and R Wilson, Jr (J A M A 99 1557 (Nov 5) 1932), the classification of the blood dyscrasias following the therapeutic administration of arsenicals presents a complex picture From an analysis of all the cases that can be found reported in the literature, they conclude that there are 3 main divisions into which such cases can be classified (1) thrombocytopenic, (2) granulocytopenic and agranulocytic, and (3) aplastic In addition, there are a few cases with entirely atypical manifestations which

defy classification and will be discussed separately. On this basis, all the cases found have been tabulated and conclusions drawn as to the prognosis and indicated therapy in each group. Into the *first group* have been placed those cases which show no evidence of depressed bone-marrow function, the essential feature being a rather marked acute thrombocytopenia, with purpura and external hemorrhages. The *second group*, the granulocytopenic, includes those cases which are characterized by depression of the granulocytic white cell elements, the red cells and platelets being relatively free of changes. The *third large group*, the aplastic, comprises those cases in which all the cellular elements of the blood stream have been affected to some extent.

The literature regarding *agranulocytosis* is now voluminous and the diagnosis of this striking clinical picture is absolute after a careful blood study. The typical Schultz picture is that of an acute febrile attack, frequently associated with an angina, great prostration, frequently jaundice, normal red blood count, a marked leukopenia with an absence of granulocytes. The disease is more commonly observed in females and ulcerations may be found in the genital as well as the upper respiratory tract. All cases show a characteristic aplasia of the bone-marrow. The therapy in this disease is entirely empirical and many procedures have been resorted to. X-ray treatment has been described in detail by A. E. Taussig and Paul C. Schnoebelen (J. A. M. A. 97:1757 (Dec 12) 1931) and they also reviewed statistically 334 authentic cases. They show that with x-ray therapy the mortality is the lowest, namely 53 per cent, by transfusions it is 64 per cent, by arsphenamine it is 73 per cent and

other therapeutic measures, such as injections of purine bases using the salts of adenine and guanine, the use of liver extract, etc., show a mortality of 75 per cent.

Many cases of *recurrent granulopenia* have been reported. H. Harkins (J. A. M. A. 99:1132 (Oct 1) 1932) states that most persons with acute cases would have recurrences if they did not die from the first attack. Few patients observed over a long period of time are still alive. Two years ago, he reported 8 cases with 4 recoveries, while today only 2 of the patients are alive and the diagnosis is questioned in 1 of them.

Regarding the deficiency of symptoms in *chronic agranulocytosis*, T. Doxiades (Klin. Wchnschr. 11:419 (Mar 5) 1932) relates the clinical histories of 3 patients with severe leukopenia or agranulocytosis in which the disease took a chronic and perhaps a benign course. In one of these cases there existed a reduction of the granulocytes for 3 years, with occasional latent intervals. During this period the patient passed through numerous infections, during which low as well as higher leukocyte values could be demonstrated. The transition from almost complete disappearance of the granulocytes to normal values of polymorphonuclear leukocytes took place without any therapeutic intervention whatever. In the experimental production of agranulocytosis, R. R. Kiacke (Am. J. Clin. Path. 2:11 (Jan.) 1932) states that agranulocytosis is a clinical entity whose pathology is probably primary in the bone-marrow, followed by sepsis, which may be either local or general, or followed by no evidence of sepsis. He describes experiments in which he noted that subcutaneous injections of benzene and

olive oil (if given in sufficiently small doses, so as not to affect the erythroblastic tissues) resulted in the development of clinical agranulocytosis in rabbits. The smaller the dose, the more selective became the affinity for the myelocytic tissues. The course of the condition seemed to be similar to that seen in human beings, *i e*, first a neutropenia, then generalized infection from organisms already present, or from organisms introduced. Agranulocytosis with subsequent infection and without infection was produced by the subcutaneous injection of benzene without olive oil and also by the intraperitoneal injection of benzene. Benzene inhalations failed to depress the leukocyte count. The intravenous injection of benzene, even in small doses, resulted in the immediate death of the animal, so it is probable that oxidation products of benzene are directly responsible for its leukocyte depressing properties. Agranulocytosis can be produced with benzene in a rabbit having a leukocytosis. The author believes that, although the etiology of granulocytosis is unknown, the benzene ring must be strongly considered. He recommends that those who have the opportunity to study this disease direct their attention to a careful history of possible contact with substances producing granulopenia, bearing in mind that when the patient consults the physician, he presents the terminal stage of a disease that possibly began months before.

Since laryngologists are called upon to treat cases having cervical gland adenopathy and ulcerative lesions about the throat, they frequently come across cases of leukemia, Hodgkin's disease, infectious mononucleosis, etc. In *leukemia* changes are often found in the upper respiratory tract and these can be

divided into 2 groups, *i e*, (1) the inflammatory ulcerative group, and (2) the tumor-like group. The inflammatory and ulcerative changes in the upper respiratory tract in leukemia occur in association with similar lesions in the oral cavity or independently of such lesions. The latter holds true especially if the teeth are absent. The changes usually start in the tonsils, spread to the pillars of the tonsils, to the back of the tongue, to the pharynx and epiglottis, and even to the larynx and trachea. There is a thick greenish-white membrane covering the tongue, soft palate, pillars and tonsils, and a gangrenous, sloughing, foul smelling, dirty, grayish exudate which comes off easily and leaves an irregular deep ulceration.

The *first stage* of these changes is a hemorrhagic extravasation, as part of the generalized hemorrhagic diathesis. These hemorrhagic areas become infected, gangrenous and ulcerated, because in leukemic conditions the defense reactions of the body are diminished. Thus, hemorrhages change into a pseudomembranous and gangrenous inflammation, and, after sloughing of the dead tissue, into ulcers. The inflammatory, ulcerative lesions are encountered most frequently in the acute form of leukemia.

The *second type* of change in the upper respiratory tract in leukemia is the tumor-like infiltration of the tissues by the leukemic cells. Most of these cases show the first changes in the tonsils. Usually the tonsil on one side starts swelling, and often this swelling later extends down to the pharynx and to the epiglottis. The infiltrations are quite firm, and on microscopic examination are seen to be composed of leukemic cells. In a few cases the leukemic changes occur in the uvula before other

manifestations of the leukemia are visible

Infectious mononucleosis is ushered in with symptoms of an acute infection, *i.e.*, headache, fever, chills, sore throat and malaise. The throat condition is constantly present, such as intense injection of fauces, scattered patches of exudate or actual ulcerative lesions on the tonsils. General adenopathy, most marked in the upper cervical region, but involving also the axillary, inguinal and epitrochlear lymph nodes, is one of the most conspicuous features. The spleen is frequently enlarged, sometimes the liver also. Petechiæ may be seen on the buccal surfaces. Cough may be present, possibly due to enlarged mediastinal nodes. The fever may go as high as 102° or 103° F (38.9° to 39.4° C), but often very slight elevations are noted. Abdominal pain is sometimes complained of. The enlarged lymph nodes are smooth, discrete, tender to a slight extent, firm and may reach a diameter of 1 or 2 cm. The hemoglobin is normal, but the white cells are markedly changed, this being the chief diagnostic feature. The leukocytes increase shortly after the onset and the mononucleosis is present by the termination of the first week. The leukocytosis ranges from 11,000 and 26,000, with a marked lymphocytosis, the lymphocyte percentage being between 57 and 92 per cent. The red cells are unchanged. The diagnosis of this condition is often difficult because of its resemblance to other acute infections and because so many mild cases are encountered. Although there exist differences of opinion regarding the relationship which this disease has with glandular fever, they appear to be one and the same. A Nyfeld (*Ugesk. f. Læger*, 94: 279 (Mar 17) 1932) describes the his-

tory, clinical aspect, diagnosis and differential diagnosis of this condition, partly from study of the literature. He urges examination of the blood in all diseases of the throat, in order to make sure of the diagnosis, particularly for the timely diagnosis of agranulocytosis.

Lymphoid cellular angina must be differentiated from agranulocytosis. W. Schultz (*Ztschr. f. Laryng., Rhin. (Teil 1. Folia oto-laryng.)* 21: 367 (July) 1931) defines the terms "agranulocytosis" and "lymphoid cellular angina." He points out that both terms are derived from hematology. The granulocytes, the absence of which is the essential factor of agranulocytosis, are polymorphonuclear neutrophilic and eosinophilic leukocytes. In hematology, "lymphoid" does not signify resembling lymphocytes, but lymphoid leukocytes are basophil nongranulated cell elements. The author further describes the symptomatology, the characteristic changes in the blood, and the treatment for agranulocytosis. In regard to lymphoid cellular angina, he states that it is now considered as a generalized systemic disease of the lymphatic organs. In the first cases observed, monocytic blood elements predominated, and the disease was designated as monocytic angina. Later observation revealed, however, that lymphocytes predominated, and for this reason it was termed lymphoid cellular angina, the term lymphoid including both lymphocytes and monocytes. However, the author takes exception to the recently advanced theory that lymphoid cellular angina is identical with Pfeiffer's glandular fever. Pfeiffer's glandular fever is usually of short duration, affects mostly children and is easily communicable, whereas lymphoid cellular angina lasts longer and affects mostly young people between the ages of 15

and 25, but not children, in 50 cases of lymphoid cellular angina there never was a direct transmission. The author also directs attention to certain peculiarities in the symptomatology of lymphoid cellular angina, and he then discusses the differential diagnosis. The prognosis he considers as comparatively favorable, and the treatment as mostly symptomatic.

The laboratory finds its greatest usefulness in the diagnosis of blood dyscrasias and this fact is emphasized when various forms of stomatitis and glossitis are encountered. W. Mager (*Monatsschr f Ohrenh* 66 315 (Mar) 1932) discusses the importance attached to recognition of this condition, which he considers not only an early symptom, but frequently an initial symptom of pernicious anemia. The subjective symptoms are intermittently occurring sensations of pain, burning and soreness of the tongue and oral mucous membrane which are exacerbated by ingestion of hot or acidic foods. Objectively, the tongue has a smooth, polished-looking surface, and occasionally the tip edges and dorsal surface appear inflamed. In some cases there is formation of small vesicles and loss of epithelium extending to the soft palate and the buccal mucous membrane, the condition then resembling aphthous stomatitis or even syphilitic stomatitis. The 2 cases which he reported were of this type. Diagnosis was determined by the blood picture which revealed hyperchromia, anisocytosis, poikilocytosis, relative lymphocytosis and the presence of megalocytes, although the erythrocytes were not decreased in number and there was no clinical symptom of pernicious anemia except the glossitis. In 1 case, the glossitis existed when the only manifestations of changes in the blood were a

slight poikilocytosis and a slight lymphocytosis. The author emphasizes the importance of examining the blood picture in cases of stomatitis to avoid overlooking an existing pernicious anemia, especially in view of the beneficial results of early liver therapy.

BONES.—Advances in the knowledge of the physiology and pathology have been conspicuous in recent years, and these steps forward have placed in the hands of the medical profession a number of valuable weapons for diagnosing, preventing and curing many of the more common metabolic bone diseases, as reported by E. Mellanby (*Brit M J* 2 865 (Nov 12) 1932).

Enrichment in knowledge has depended chiefly on 2 lines of investigation, the influence on bone structure of (1) dietetic and environmental factors, (2) the parathyroid glands. Thus, methods of radiography, histological technic, and blood and urinary chemistry, are more precise and valuable now as instruments of precision. Furthermore, the morbid pathology has been increased in value by its association with the experimental method.

INFLUENCE OF DIETETIC AND ENVIRONMENTAL FACTORS.—In the normal animal, the structure of bone is the outcome of a struggle between 2 influences, one tending to produce perfect formation and calcification with the deposition in the matrix of a compound chiefly of calcium phosphate, the other tending to prevent the adequate deposition of this compound, and thus produce bone built up of comparatively soft, partially calcified tissue. Assisting in calcification are (1) an adequate supply of calcium and phosphorus, (2) an adequate supply of vitamin D either in the food or as syn-

thesized in the body by the exposure of the skin to sunlight or some other source of ultraviolet radiation. The factors preventing perfect calcification are (1) those dietetic substances which induce growth without, at the same time, supplying a corresponding calcifying substance, (2) the foods which not only encourage growth but in some cases, at least, actively interfere with the retention of calcium salts in the body and so prevent the deposition of calcium phosphate in the bone matrix.

Foods stimulating the formation of perfect bone are milk, cheese, butter, egg yolk, and the fat of meat and fish. All of these contain vitamine D, and some, such as cheese, milk, and egg yolk, are at the same time, rich in calcium and phosphorus. The principal foods hindering calcification are cereals, including bread, oatmeal, maize, rice, etc. Other foods which, by stimulating growth and not exerting a corresponding influence on calcification, tend to bring about defective bone formation, include lean meat and white fish and most vegetable fats. Vegetables and fruits are more or less indifferent in their action, although sometimes the calcium content, particularly in green vegetables, may aid calcification. Green vegetables may also at times contain a small amount of vitamine D, particularly if recently exposed to sunlight. Vitamine C in fruit and vegetables prevents scurvy and thus defends the bones against any scorbutic influences.

Thus, it may be seen that the demand for the inclusion of calcifying foods in the diet is greatest (1) during growth and (2) when cereals are the main constituents of the diet. When a child's consumption of food is limited, the greater amount of bread and other cereals eaten, the less likely is it that

sufficient milk, eggs, suet, etc., will be consumed to ensure proper bone formation.

BONE DISEASES DUE TO DEFECTIVE FEEDINGS — *Rickets, Late Rickets and Osteomalacia* —

When the dietetic conditions in infancy and childhood are unbalanced, rickets follows, if such conditions prevail in adolescence, late rickets may develop. Even in the adult, when all growth has ceased, bone is not in a static condition, but is constantly being absorbed and reformed. Thus, a poor calcifying diet in the adult, extending over a long time, may result in osteomalacia, especially when there are increased calls on the mineral constituents of bone as in pregnancy. Associated with, or independently of, these states, osteoporosis may develop. As age advances, partly because of the relatively small rate of growth and partly due to some unknown factor which ensures greater stability to the bony skeleton, gross bone deformity of dietetic origin becomes rarer, so that whereas rickets and its associated deformities in early childhood are extremely common in this country, late rickets and osteomalacia are rare.

Prevention of Rickets — A satisfactory method is to increase the consumption of milk, and especially to procure breast-feeding by properly fed mothers. Although it is true that the need for a large intake of vitamine D is less when the diet is wholly milk than when it is mixed, it must be kept in mind that the younger the child, the greater is the tendency to rickets, and that many samples of both cow's and human milk do not contain sufficient vitamine D to ensure perfect bone formation in early life, even when milk is the only food ingested. For this reason, supplementary dietary additions rich in vitamine D are

advisable for all infants and children, as well as for the nursing mother. Cod-liver oil is a specific against rickets as well as a curative agent of great potency. From 1 to 3 teaspoonfuls daily are ample as a prophylactic, being started at birth. When the milk consumption is small and the cereal intake large, the need for cod-liver oil is, of course, greater. Apart from its vitamin D content, cod-liver oil is rich in at least 2 other dietary factors often found deficient in the ordinary diet, *viz*, vitamin A and iodine. It is easily taken by infants and young children if given by a reasonably sensible mother or nurse.

Cereals form far too great a part of the diet at all ages, and should be replaced to a large extent by milk, eggs, cheese, vegetables and fruit throughout life. Butter cannot act as a substitute for milk, since in the presence of cereals the antirachitic action of butter is small. Bread and butter is not much better than bread alone, although other factors, such as a high caloric value, and vitamin A are important attributes of butter. However, butter can be made much more strongly antirachitic by giving it with additional calcium, thus, butter with 10 per cent calcium phosphate or carbonate has a powerful antirachitic action. If some way could be developed of making butter so that it retained the calcium of the milk, a great advance in the improvement of bone formation would follow.

Osteotomy—With improved control of rickets and its resulting bone deformities, the need for osteotomy should have almost disappeared. So long as a growing child receives a diet rich in vitamin D, calcium and phosphorus, it will correct most gross bone deformities of the limbs. Treatment for a year

or more is generally necessary in such cases. Osteotomy to correct bone deformity due to rickets should only be performed when growth is ceasing or has ceased, and the operation should be followed by a diet of high calcifying qualities.

Late Rickets and Osteomalacia.—These conditions can both be cured by the treatment specific for rickets. Cod-liver oil or some other source of vitamin D, such as irradiated ergosterol, is curative, particularly when the diet is improved in its mineral salt content. As it is more difficult to produce defectively calcified bones in the adult than in the infant and young child, it is questionable whether a simple vitamin D deficiency is the cause of these conditions. There can be little doubt that the calcium intake is also very deficient, so that the bones lose their stores of this substance. The fact that osteomalacia is most often found in countries where there is abundant sunlight, is a curious commentary on modern discoveries concerning the effect of ultraviolet rays and bone calcification, and indicates the prepondering influence of diet.

In *osteomalacia* the serum calcium is usually low, 5 to 7 mg per 100 c c, and rises rapidly on the administration of vitamin D and calcium. Tetany is a common accompaniment of osteomalacia, but responds to the dietetic treatment of the disease.

There is now an international unit of activity of vitamin D. An ordinary sample of cod-liver oil contains about 100 units per c c, but good samples may contain up to 250 units per c c. For ordinary purposes it is probably not desirable to use those of greater strength than 3000 units per c c.

Hypervitaminosis D.—The danger of this condition, due to the administra-

tion of potent preparations of vitamine D, is small if the infant or child also has plenty of milk. If concentrated preparations are given to marasmic infants and children not taking a reasonable amount of milk and other food, there is a real danger of producing hypervitaminosis, with calcification of the kidney vessels and tubules. To cure rickets under ordinary dietetic conditions, 20 cc (5 drams) of cod-liver oil containing on an average 2000 to 3000 units of vitamine D are sufficient. These figures are given as a general guide for avoiding hypervitaminosis, but it is always desirable to see that the diet itself is good when vitamine D is given in large doses. For marasmic children, it is probably better and safer to give cod-liver oil in small doses at first and then increase it gradually, rather than to give irradiated ergosterol.

Generalized Osteitis Fibrosa Cystica (von Recklinghausen's Disease).

—Parathyroid and Bone Structure— The subject of bone defect associated with parathyroid abnormalities has been studied with enthusiasm during the past few years. The diagnosis calls for complete laboratory equipment, and involves radiography, blood chemistry, and, when possible, a chemical balance sheet of calcium and phosphorus intake and output. Rarefaction of the bones, sometimes with osteoclastomata and cysts, which may or may not expand the bone itself, the high serum calcium, over 10 mg per 100 cc, the low plasma phosphorus, below 3 or 4 mg per 100 cc, the high blood phosphatase, the large loss of calcium via the urine, even when on a low calcium diet—all these facts must be considered in the diagnosis.

Osteitis fibrosa is not of necessity associated with the above described blood and urinary changes, nor with

hyperplasia of the parathyroid, nor are all cases of parathyroid hypertrophy associated with osteitis fibrosa. In 47 cases, Hoffheinz found only 27 suffering from bone abnormality, including 17 cases of osteitis fibrosa, 8 cases of osteomalacia, and 2 cases of rickets.

Treatment—The removal, surgically or by x-ray therapy, of the enlarged or adenomatous parathyroid in generalized osteitis fibrosa is followed by dramatic results, the most immediate important changes being the reduction or disappearance of the disabling pain and weakness and the diminution of the blood and urinary calcium.

While tetany may follow the operative removal of the hyperplastic parathyroid, this condition can be adequately controlled by parathyroid extract. Nevertheless, there is much to be learned about this condition—the cause of the parathyroid hyperplasia often of only one gland, the reason why a more general hypertrophy of the parathyroid glands is associated sometimes also with other defective conditions, as for example, osteomalacia and rickets, the origin of the pain which is so disabling, and of which such complaint is made by the patient, the action of parathyroid hormone on the blood and on the bones, and especially its relation to osteoclastic activity, and finally, the reason why the tendency to tetany following operation diminishes after the first few days. These questions as yet are unanswered.

F. W. Wichmann (*Deutsche Ztschr f Chir* 235 619 (Apr 7) 1932) describes a case of osteitis fibrosa generalisata (von Recklinghausen) in a woman, aged 45. The removal of an intrathyroidally located adenoma of the parathyroid from the left side of the thyroid, which was slightly enlarged, was followed by a progressive improve-

SOME INDICATIONS FOR DIFFERENTIAL DIAGNOSIS OF SOME BONE DISEASES
IN THE ADULT

	X-ray Examination	Blood Examination			Urinary Examination	Time of Onset
		Calcium in Serum	Phosphorus in Plasma	Phosphatase		
Generalized osteitis fibrosa cystica	Involves many bones Multiple cystic areas with little sclerosis Cysts and osteoclastomata may extend along axes or may expand cortically Diminished density of bone shadows	High, usually above 13 mg per 100 cc	Low, usually below 3 mg per 100 cc	High	Calcium and phosphorus several times as high as normal, even on low calcium diet	Early adult life and later—20 up to 55
Local osteitis fibrosa	Often only one bone affected Spacing out of lamellæ to form cystic areas	Normal	Normal	Normal	Calcium and phosphorus excretion normal	Chiefly in adolescence
Osteitis deformans	Bones thickened May affect only one bone, but usually extends to others Skull may be thickened and woolly Pelvis often first affected Bone structure eventually lost, and acquires more or less uniform density	Normal	Normal	High	Calcium and phosphorus excretion normal	Later life—45 to 65
Osteomalacia	General rarefaction of bones and structure to some extent lost Shafts of long bones reduced in girth, and cortex diminished "Drumstick" appearance of long bones Coxa vara, increased convexity of sacrum, sclerosis, and triradiate pelvis	Low (5 to 8 mg per 100 cc), but rises on giving vitamine D and calcium	Usually low (2 to 4 mg per 100 cc)	High, but diminishes on giving vitamine D and calcium	Usually high calcium excretion	Often associated with pregnancy or history of famine conditions
Healed rickets with deformity	Bones deformed, but otherwise normal	Normal	Normal	Normal	Calcium and phosphorus excretion normal	History of deformity in childhood or adolescence

ment in the general condition The greatly changed calcium metabolism returned to normal This case again brings out the close relation of osteitis fibrosa generalisata to the parathyroids and demonstrates that surgical removal of a pathologically changed parathyroid, even if it is intrathyroidal and only slightly enlarged, can bring about a successful result

Osteitis Deformans (Paget's Disease).—The etiology of osteitis deformans is still unknown, according to Mellanby (*loc. cit*) This disease is much more common than generalized osteitis fibrosa, and its early pathology is so similar to that of osteitis fibrosa, that it might be regarded as hyperparathyroidism in part, although no evidence that such is the case has ever been ad-

duced This disease attacks older individuals more frequently than does osteitis fibrosa It is more chronic in nature, and the absorption of bone and its new formation keep pace better than in osteitis fibrosa, where rarefaction predominates Undoubtedly, there is some etiological factor in common between osteitis fibrosa and osteitis deformans

Treatment—Mellanby (*loc cit*) has treated osteitis deformans by giving a high calcifying diet including much milk and egg yolk with cod-liver oil. Although absorption of bone in osteitis deformans is active, the tendency to recalcification and laying down of new bone is still great Recalcification may be encouraged by diet

Renal Rickets.—*Kidney and Bone Structure*—Renal rickets can probably be classed with osteitis fibrosa as being due, not to diet, but to some derangement of the functional activity of an organ (in this particular case the kidney), and as having no direct relation to ordinary infantile rickets The rachitic changes in the bones are associated with sclerotic kidneys and the bones do not respond to treatment with vitamin D and a high calcifying diet Parsons has laid particular stress and importance on the inability of the kidneys to excrete phosphorus in renal rickets Certain clinical indications exist that the kidneys and parathyroid glands are closely related in their actions The relation of the kidneys to calcium metabolism seems to be a promising line for further investigation

TUMORS, MALIGNANT.—

Treatment—In any bone lesion which is multiple, the treatment resolves itself into the application of palliative measures, as reviewed by S Moore (Am J. Surg 18 403 (Dec) 1932)

Radiation therapy is most useful in

this connection as a palliative measure; however, the longer it is applied, the less efficient it proves, and it should not be resorted to until symptoms are present Any skeletal lesion of the extremities which is definitely osteogenic sarcoma, before the stage of metastasis, should be treated with radical surgery. Routine preoperative or postoperative radiation as a prophylactic measure in sarcoma may be used, although Moore regards it with a neutral attitude and uses it only when requested to do so by the surgeon.

The author believes that *endothelial myeloma* should be treated by radiation alone, since it is a type of systemic disease rather than a local process

Where widespread *metastases* from osteogenic sarcoma cause great pain, cachexia, etc., radiation should be applied Cases in which surgery is of little value should be given the benefit of radiation therapy.

BRAIN. — ABSCESS.—M A Rabinowitz, I. H Marcus and J Weinstein (J. A. M. A. 98:806 (Mar. 5) 1932) report an unusual case of subacute bacterial endocarditis with large brain abscess. The boy of 15 years of age had had poliomyelitis at 9 and rheumatic fever at 13 and for the 6 weeks prior to admission symptoms of a generalized infection Five days prior to admission he developed a complete left-sided paralysis without loss of consciousness. The significant findings on examination were loss of weight of 16 pounds in 6 weeks, fever of 104° F (40° C.), rheumatic mitral and aortic involvement, splenomegaly petechiæ, left hemiplegia, with dysphagia and leukocytosis At necropsy 1 month later, a cerebral abscess in the right frontoparietal region and a subpial hem-

orrhage over the left frontoparietal area were found

BRAIN TUMOR.—Neurological literature deals with the subject of brain tumor most extensively, and ranks with first importance in a survey of all subjects of neurological nature. The apparent reasons for this are the natural difficulties encountered in diagnosis, the constantly improving surgical technic, and the decreasing mortality rate.

CLASSIFICATION.—Reporting on the *histologic classification of tumors of the central nervous system*, G Roussy and C Oberling (Arch Neurol and Psychiat 27 1281 (June) 1932) divide tumors into 5 classifications which, in the order of their frequency, are

- 1 Gliomas (including astrocytomas, oligodendrocytomas and glioblastomas)
- 2 Ganglioneuromas
- 3 Ependymochoroid tumors
- 4 Neurospongiomas
- 5 Neuroepitheliomas

A table is appended showing the relative frequency of tumors in these 5 groups.

Total number of cases studied 251

Astrocytomas	119
Oligodendrocytomas	16
Glioblastomas	43
Ependymocytomas	14
Ependymoblastomas	9
Ependymogliomas	3
Choroid papillomas	4
Epitheliomas	3
Ganglioneuromas	1
Neurospongiomas	20
Neuro-epitheliomas	2
Unclassified tumors	22

P Bailey (*Ibid* 27 1290 (June) 1932) considers that there are 3 large groups (exclusive of meningeal tumors), *i e*, medulloblastomas, glioblastomas and astrocytomas and a lesser group comprising oligodendrogliomas, spongioblastomas, astroblastomas, ependymomas and

ependymoblastomas, pinealomas and pineoblastomas, ganglioneuromas and neuro-epitheliomas

The question of classification of brain tumors along hard and fast lines is extremely difficult and the ground is being fought over constantly with no generally accepted unanimity of opinion.

C A Elsburg (Bull Neurol Inst. New York 1 389 (Nov) 1931) reports that in a series of 767 verified brain tumors, 13.2 per cent comprised meningeal growths. He would limit the classification to *parasagittal fibroblastomas* of those which spring from the sinus, falx or adjacent dura. Such parasagittal tumors comprised 24.5 per cent of the meningeal growths.

SYMPTOMS.—Data obtained by F A Gibbs (Arch Neurol. and Psychiat 28 969 (Nov) 1932) from an analysis of records of 1545 verified cases of tumor of the brain classifies the symptoms as follows:

SYMPTOMS STUDIED AND NUMBER OF CASES WITH A GIVEN SYMPTOM

Symptom	No. Cases
1 Aphasia .	205
2 Focal convulsions	100
3 General convulsions	141
4 Tremor	42
5 Olfactory hallucinations	74
6 Gustatory hallucinations	32
7 Visual hallucinations	51
8 Irritability .	27
9 Jocularly	33
10 Difficulty in micturating	20
11 Urinary incontinence	164
12 Projectile vomiting	162
13 Cessation of menses	113
14 Loss of sexual appetite	89
15 Sexual hypoplasia	53
16 Acromegaly	40
17 Polydipsia	84
18 Craving for sweets	38
19 Rapid gain in weight	16
20 Drowsiness	225
21 Impairment of hearing	224
22 Nystagmus	332

Symptom	No Cases
23 Positive Romberg sign	315
24 Choked disc of 4 diopters or above	275
25 Hemorrhage in nerve head or retina	232
26 Veins of eyelids dilated	95
27 Exophthalmos	145

The symptoms, as grouped, occurred with certain *major* frequencies in varying cerebral positions as follows

Aphasia Temporal lobes
 Focal convulsions Parietal lobes
 General convulsions Left temporal lobe
 Tremors Left lenticular nucleus
 Olfactory hallucinations Left thalamus
 Gustatory hallucinations Left caudate, left lenticular nuclei or left thalamus.
 Visual hallucinations Right thalamus
 Auditory hallucinations Right frontal lobe
 Irritability Both caudate and lenticular nuclei
 Jocularly Left thalamus
 Difficulty in micturition Caudate or lenticular nuclei
 Urinary incontinence Left caudate or lenticular nuclei, or pineal region.
 Projectile vomiting Right lenticular nucleus
 Drowsiness Pineal region
 Amenorrhea Hypophysis or pineal region.
 Anaphrodisia Hypophysis or pineal region
 Sexual hypoplasia Suprahypophyseal region.
 Acromegaly Hypophysis
 Polydipsia Suprahypophyseal region, pineal region or hypophyseal region.
 Craving for sweets Left thalamus
 Rapid weight gain Right thalamus or pineal region
 Impaired hearing Cerebellopontile angle.
 Nystagmus Cerebellopontile angle
 Positive Romberg Cerebellopontile angle
 High choking of discs Fourth ventricle.
 Hemorrhage in optic nerve head or retina: Thalamus, cerebellopontile angle or cerebellum
 Dilated veins of eyelids: Left thalamus, left occipital lobe or cerebellum.
 Exophthalmos Temporal lobe or cerebellopontile angle.

Some of the conclusions reached are (1) Generalized convulsions are not most readily produced by tumors that compress the motor cortex (2) Projectile vomiting is not a general pressure symptom (3) Tumors blocking the ventricular system are not markedly superior to all others in producing high grade choked disc

In another paper the same author (*Ibid* 27 828 (Apr) 1932) analyzed 330 cases of brain tumor with unequally choked discs and came to the following conclusions:

- 1 Greater choking tends to occur on the same side as the tumor
- 2 The incidence of homolaterally greater choking is highest among tumors of the temporal and parietal lobes
3. The incidence of contralaterally greater choking is highest among occipital tumors.
4. The incidence of homolaterally greater choking is higher among cases of parietal tumor with low-grade choked disc than among similar cases with high-grade choked disc
5. The incidence of homolaterally greater choking is lower among cases of occipital tumor with low-grade choked disc than among similar cases with high-grade choked disc.
6. There is no significant association between the side of greater choking and the side of greater involvement of cranial nerves III to VII

Tumors in varying localities produce symptoms which point to the areas involved, but in other instances the localization may not be clear. Thus, Allen and Lovell (*Ibid* 28: 990 (Nov.) 1932) discuss tumors of the *third ventricle* in reporting 8 cases with the following conclusions:

1. Tumors arising in the posterior portion of the third ventricle are relatively infrequent.
2. Hydrocephalus and increased intracranial pressure resulting from obstruction to the aqueduct of Sylvius are constant.

- 3 Lesions in this location usually produce no characteristic symptoms or localizing signs. The most commonly noted findings are papilledema, increased intracranial pressure, hypersomnia, disturbances of pupillary reaction, extra-ocular palsies, vegetative dyscrasias and precocious sexual development. Cerebellar symptoms are often confusing and the lesion may be erroneously ascribed to the hind-brain. Sudden death is frequent.
- 4 Paralysis of upward associated ocular movements and precocious sexual development in male children before the age of puberty are the most important clinical findings, in the absence of which the clinical diagnosis of pineal tumors is almost impossible.
- 5 Visualization of the lesion frequently by ventriculography makes this a most important diagnostic procedure.

F Kennedy (J A M A 98 864 (Mar 12) 1932) states that alterations in mental and emotional conditions appear more frequently in *frontal lobe tumor* than in expanding lesions elsewhere. The symptoms shown are lessening of power of attention, irrelevant replies, trivial jocosity, short periods of excitement, causeless laughter, taking offense easily, and sudden attacks of mental confusion. As pressure increases, hebetude develops, lapsing into stupor. Yawning, urinary incontinence and speech difficulty are found also. Headache is a less prominent feature. The one reliable diagnostic sign of frontal tumors, when present, is "reduction in ipsilateral acuity of vision due to an ipsilateral compression neuritis of the optic nerve lying below the frontal lobe, coincident with papilledema and normal vision in the opposite eye. Anosmia on the ipsilateral side occurs only when the tumor is so placed that it produces direct pressure, in a tumor situated more deeply, there will be bilateral papilledema without central scotoma or loss of visual acuity. With

direct pressure, atrophy of the disc follows.

DIAGNOSIS.—In *temporosphenoidal tumors* localization depends, according to Kennedy (*Ibid*), mainly on the involvement of contiguous structures. Motor signs in the nature of paralyses are marked in the face, less in the arms, and least in the legs. Sensory changes on the opposite side of the body indicate thalamic involvement. The most accurate signs, however, are quadrantic homonymous defects in the contralateral visual field (from involvement of Myer's loop of the temporal optic fibers). There may be complete homonymous hemianopia. Sometimes there is aphasia and perseveration of speech, but no word deafness.

Tumor of the brain is most often suspected in the presence of headache, vomiting and choked disc. F C Grant (Arch Neurol and Psychiat 27 816 (Apr) 1932) has encountered 5 cases in which thorough investigation proved definitely that *vasculorenal disease* was the cause of these symptoms rather than tumor. The difficulty in clearly separating the two conditions diagnostically is attested by the fact that 2 out of the 5 cases were subjected to craniotomy. The author refers to the reports of Keith, Wagener and Kernohan who found in "*malignant hypertension*, loss of weight, cerebral symptoms and accidents, continued high blood-pressure and severe neuroretinitis." It should also be kept in mind that with persistent hypertension there is cardiac enlargement, peripheral sclerosis, retinal changes, absence of anemia, and only moderate or no reduction in renal function. In the reports of Wagener it was stated that the edema of the discs varied from 1 to 6 diopters. The presence of retinal arteriosclerosis is a differential

feature, though hemorrhages and exudate may also be found

In Grant's (*loc cit*) cases there occurred headache, vomiting and choked discs in all, while evidences of renal disease were lacking and generalized arteriosclerosis was ruled out by the youthfulness of 3 of the cases (though 1 showed some peripheral sclerosis). In the other 2 cases arteriosclerosis was definitely evident in the peripheral vessels

Generalized *epileptic attacks* of long standing in association with brain tumor are reported by E. A. B. Pritchard (Lancet 2 842 (Oct 17) 1931). He lists 5 cases of brain tumor with generalized epileptic convulsions, in one of whom convulsions occurred over a period of 18 years. He believes that the tumors in these instances are slow growing and subcortical. The seizures are not accounted for on the basis of rise in intracranial pressure, inasmuch as tumors may be present for many years before such signs are revealed. Attention is called to the fact that when convulsions occur in individuals in adult life, even though generalized in character, they should be regarded with definite suspicion as having their origin in a tumor of the brain

That certain types of brain tumor may exist for a long period of time without producing symptoms is confirmed in the report of a case by G. G. Davis and H. C. Voris (Arch Surg 25 84 (July) 1932) of a *meningioma* which had existed for 35 years. Symptoms indicative of its presence had existed but 3 months and it was surgically removed.

Paralysis of the last 4 cranial nerves is reported by C. Pinedo (Prensa med. argent 18 501 (Sept 20) 1931). The name of this rather unusual symptom complex is called "the syndrome of the

foramen lacerum posterius". In the case which Pinedo reports there was compression of the glossopharyngeal, vagus, spinal accessory and the hypoglossal nerves on the right side by a *myosarcoma* arising over the transverse processes of the first and second cervical vertebrae. The symptoms shown were anesthesia of the palate, anesthesia and paralysis of the pharynx, larynx and the tongue, difficulty in swallowing, disturbance of voice and taste, disturbance of respiration with asphyxiation, all progressing to a fatal outcome

Familial brain tumors are uncommon. L. Minski (J Neurol and Psychopath 12 289 (Apr) 1932) reports 3 members in a single generation in the same family. One had double acoustic tumors, another had spinal tumors, and a third had double acoustic tumors with generalized neurofibromatosis. All 3 cases gave a history of blows preceding the onset of symptoms, but this is held to be etiologically insignificant

F. C. Grant (Arch Neurol, and Psychiat 27 1447 (June) 1932), in discussing *ventriculography* in the presence of increased intracranial pressure, stresses the point that all fluid must be removed from the ventricles, otherwise there will be incomplete filling with air which necessarily confuses the x-ray findings. Both ventricles should be tapped and the fluid from each carefully measured to estimate any differences in size. One ventricle containing less fluid may indicate a tumor in that hemisphere, whereas a symmetrical enlargement of both ventricles may point to a midline tumor in a lower position. It is instructive to note that by means of ventriculography he localized tumor in 93 cases, 48 of whom would not have otherwise been localized. There were errors of technic in 17 cases, causing

failure in method, and the mortality was 62 per cent

In the ventricular estimation series, symmetrical ventricular distention was proved without injection of air in 13 cases and asymmetry of ventricles in 39. Of the latter, findings of asymmetry proved to be of accurate localizing value in 35 cases

Encephalography in 325 cases was also reported, with failure to localize tumor in 19.5 per cent (as compared with 10.6 per cent in ventriculography). Of the 325 cases in whom encephalograms were made, 72 were cases of idiopathic epilepsy, 51 of traumatic epilepsy and 41 of post-traumatic headache. In the idiopathic epilepsy group the encephalograms were normal in 16, and atrophy was the principal finding in 40, arachnitis in 16, and lateral ventricular asymmetry in 4. In the post-traumatic epilepsy group the encephalograms were normal in 5, atrophy was observed in 28, arachnitis in 18, and asymmetry in 23. In the traumatic headache group there were normal findings in 6, atrophy in 32, arachnitis in 3, and asymmetry in 6.

Grant considers that encephalography is of no value in relation to the number, character and severity of idiopathic epileptic fits. Post-traumatic headaches were markedly benefited by the procedure and some cases of epilepsy were benefited.

The same author takes up the reports of Moriz on *arterial encephalography*, the technic of which is as follows. Injection of from 6 to 9 cc of 25 per cent sodium iodide into one common carotid artery and taking films of the head immediately. The contour and position of the cerebral vascular tree found are compared with the normal, for evidence and localization of brain

tumor. The procedure is apt to produce convulsions and Moriz uses phenobarbital as a preoperative sedative. Advanced arteriosclerosis, uremia and toxic conditions are considered contraindications.

E. P. Pendergrass (Pennsylvania M J 35 751 (Aug) 1932) considers the value of *x-rays* as an aid in the diagnosis of brain tumor and lists 221 cases, 97 in the cerebrum, 65 in and around the pituitary fossa, and 59 in the cerebellum, all of which were operated upon. In the pituitary group the clinical diagnosis was possible in 84.6 per cent and the x-ray diagnosis correct in 90 per cent. Correlation of clinical and x-ray findings provided accurate diagnoses in 98.5 per cent. In the cerebral tumors 47.4 per cent were diagnosed correctly clinically with accurate localization in 33 per cent. X-ray evidence of increased intracranial pressure was found in 56.7 per cent and in 26.8 per cent of cases the tumor was localized. In the cerebellar group, 81.4 per cent were correctly localized clinically and x-ray diagnosis was of localizing value in 50.8 per cent.

DIFFERENTIAL DIAGNOSIS.

—O. H. P. Pepper (*Ibid* 35 75 (Nov) 1931) calls attention to the necessity for correct *differential diagnosis* between cerebral lesions and malignant hypertension. He stresses the not uncommon finding of malignant hypertension in children, with its accompanying increase of intracranial pressure and without evidences of obvious renal failure. He reports that papilledema may reach 6 diopters and states that high blood-pressure is rarely, if ever, the cause of progressive space-taking lesions of the brain. He advocates repeated spinal fluid removals to reduce intracranial pressure.

TABLE I—CEREBROSPINAL FLUID IN DIFFERENTIAL DIAGNOSIS OF BRAIN TUMOR

Disease	Pressure Mm of Spinal Fluid Horizontal Position	Rise on Jugular Com- pression	Appearance	Cells per C Mm	Protein Mg/100 Cc	Sugar Mg/100 Cc	Chloride Mg/100 Cc	Heavy Type Indicates Findings Most Important in Clinical Diagnosis
Normal Lumbar Cisternal Ventricular	70-200	Prompt	Clear Colorless, No clot	0-5 0-5 0-8	15-45 10-25 5-15	50-75 50-75 55-80	430-455 (710-750 as NaCl)	Sugar and chloride values apply to fasting persons with normal plasma values. Normal values for urea nitrogen 5-20 mg/100 cc, for nonprotein nitrogen 10-35 mg/100 cc. Globulin usually parallels protein content. Colloidal gold reaction is so variable it has little diagnostic value except where indicated below.
Brain tumor	+	N or delayed	N or yellow	Rarely increased	N or —	N or —	N	Pressure nearly always increased. Occasionally normal after catharsis or marked dehydration. See below.
Brain abscess	+	See brain tumor	Clear and colorless to turbid clot =	+	Slight increase	N or +	N	Pressure high. Polys nearly always present. Chlorides may be low if complicated by high fever. Brain abscess represents one form of "Aseptic Meningeal Reaction." Extradural abscess and lateral or cavernous sinus thrombosis give similar picture. The cell count may be only slightly increased or several thousand per cmm. In the latter case distinguish from purulent (bacterial) meningitis by normal or only slightly lowered sugar value. In purulent meningitis the sugar is nearly always below 40 mg per 100 cc. Subacute bacterial endocarditis with emboli to brain may cause increased protein (cells (polys) and protein.
Tuberculous meningitis	+	N	Opalescent to turbid faint yellow = delicate fibrin web	— Mono- nuclear	+	Decrease	Marked decrease	Chlorides nearly always below 380 mg per 100 cc (0.44 cc sodium chloride). Pressure fall in sugar (occasionally high at outset). Occasionally very early in disease and in infants polymorphonuclears predominate. Tubercle bacilli may be found in clot or sediment. Guinea-pig inoculation positive.
Epidemic encephalitis	N	N	N	N or slight increase no polymorpho- nuclears	N or slight increase	N or slight increase	N	Sugar is normal unless blood sugar is elevated. Cell count rarely exceeds 60. Over 50 per cent of cases have normal cell count. Protein increase when present is slight rarely reaching 100 mg/100 cc.
Meningo-vascular and periventricular syphilis	±	N rarely delayed	N Rare fibrin clot	—	—	N	N	Wassermann reaction nearly always positive in lumbar fluid, but may be negative in ventricular fluid. Colloidal gold reaction nearly always in parietal or tabetic zone.
Acute syphilitic meningitis	+	N	Clear to turbid faint yellow ± fibrin clot	+	+	N or slightly low	Slightly low	Chloride higher than in tuberculous meningitis, nearly always above 400 mg per 100 cc (0.60 as sodium chloride). Wassermann reaction nearly always positive.

TABLE I—CEREBROSPINAL FLUID IN DIFFERENTIAL DIAGNOSIS OF BRAIN TUMOR (Continued)

Disease	Pressure Mm of Spinal Fluid Horizontal Position	Rise on Jugular Com- pression	Appearance	Cells per C Mm	Protein Mg/100 Cc	Sugar Mg/100 Cc	Chloride Mg/100 Cc	Heavy Type Indicates Findings Most Important in Clinical Diagnosis
Cerebral arterio-sclerosis and arterial hypertension	Usually normal	N	N Occasionally slightly yellow	N or sl +	N or +	N	N	Pressure usually normal even with extreme arterial hypertension. With cardiac decompensation and high venous pressure, cerebrospinal fluid pressure will be high. Occasionally these cases have unexplained high intracranial pressure with choked disc and are extremely difficult to differentiate from brain tumor.
Uremia	+	N	N Occasionally slightly yellow	N or sl +	N or +	+	±	Urea and nonprotein nitrogen increased. Chlorides often low if there has been much vomiting, sugar high because of hyperglycemia. Colloidal gold may show parietal curve. Occasionally cells or protein may be slightly increased and slight yellow color may be present.
Subdural hematoma	+	N	Yellow or N	N Occas few red blood cells	N or sl +	N	N	A yellow fluid under increased pressure with normal or only slightly increased protein rarely occurs in any other condition.
Subarachnoid or ventricular hemorrhage	+	N	Bloody, supernatant yellow	+	+	N	N	All tubes equally bloody. Does not clot. Yellow tint to supernatant fluid within 4 hours after hemorrhage. This increases for 8 to 10 days until all red cells have disappeared. White blood cells often increased in fluid, at first, polymorphonuclears, later, mononuclear cells. When blood disappears, pressure becomes normal. If bleeding due to tumor, pressure remains high.
"Bloody tap" normal fluid	N	N	Bloody, supernatant clear	+	±	N	N	Variation in amount of blood in different tubes. If much blood present, clot will form. Supernatant fluid clear and colorless, or pink if hemolysis has taken place, never yellow.
"Epilepsy"	N	N	N	N	N	N	N	Normal fluid. Protein occasionally slightly increased.
Myxedema	+	N	N	N	+	N	N	Usually mild tabetic colloidal gold reaction. Pressure, protein and colloidal gold reaction return to normal under thyroid therapy.
Multiple sclerosis	N	N	N	±	±	N	N	A strong parietal or tabetic colloidal gold reaction in presence of negative Wassermann reaction in patient not previously treated for syphilis is strong evidence for multiple sclerosis.
Lead encephalopathy	+	N	N or slightly yellow	+	N or +	N or +	N	Cells nearly always increased, occasionally up to several thousand—chiefly lymphocytes. Occasionally polymorphonuclears predominate, especially in children. Pressure nearly always elevated. Lead is present in cerebrospinal fluid.

TABLE I—CEREBROSPINAL FLUID IN DIFFERENTIAL DIAGNOSIS OF BRAIN TUMOR (Continued)

COMPARISON OF LUMBAR AND VENTRICULAR FLUID IN BRAIN TUMOR

Disease	Pressure Mm. of Spinal Fluid Horizontal Position	Rise on Jugular Com- pression	Appearance	Cells per C. Mm.	Protein Mg./100 C c.	Sugar Mg./100 C c.	Chloride Mg./100 C c.	Comment Heavy Type Indicates Findings Most Important in Clinical Diagnosis
Lumbar. Ventricular. Lumbar. Ventricular.	+	N	N	N	N or slight increase	N or +	N	Above Tentorium. Pressure nearly always in- creased. Ventricular fluid normal unless tumor invades wall of ventricle, when protein will be in- creased in fluid from that ventricle and in lumbar fluid. The uninvolved ventricle may have normal fluid. A tumor involving the subarachnoid surface of brain may give increase in cells in lumbar fluid but ventricular fluid is normal. Xanthochromia sometimes present when protein is increased. A degenerating tumor involving wall of ven- tricle may give cellular increase both in ventricu- lar and lumbar fluid. Rarely polymorphonuclears predominate. A degenerating tumor involving sub- arachnoid surface of brain may give increase in cells in lumbar fluid but not in ventricular fluid. Tumors of optic chiasm may cause mononuclear cell increase in lumbar fluid. Leukemic tumors may cause increase in lymphocytes. Tumor of third ventricle may give increased protein in both lumbar and lateral ventricular fluid and a delayed response to jugular compres- sion in lumbar manometer.
Lumbar. Ventricular. Lumbar. Ventricular.	+	N	Occasionally faintly yellow.	N or slight increase.	+	N or +	N	A bleeding tumor gives hemorrhagic fluid like subarachnoid hemorrhage (see above). Pressure remains high after bleeding ceases. Protein may be excessively high for amount of blood present.
Lumbar. Ventricular. Lumbar. Ventricular.	+	N or delayed.	N	N	Slight increase or N	N or +	N	Below Tentorium. Pressure nearly always in- creased. The ventricular fluid is normal. The lumbar fluid may be normal or show increased protein and sometimes xanthochromia. Acoustic neuroma is nearly always cause a definite increase in protein in the lumbar fluid. Cerebellar tumors may produce no increase or a slight increase in protein in the lumbar fluid. Tumors of the fourth ventricle usually produce no abnormality in the lumbar or ventricular fluid. Tumors below the tentorium often produce a partial "subtentorial block" so that the response to jugular compression is delayed in the lumbar fluid. Glioma of pons may give normal pressure normal protein, and normal response to jugular compression. Polioencephalitis (etiology unknown) occasionally gives choked disc, with high pressure, marked in- crease in protein and sometimes yellow color. Lumbar puncture in patients with choked disc may be dangerous unless the ventricle is tapped at the same time.

The careful examination of the *cerebrospinal fluid* in cases of brain tumor is of extreme value when carried out properly F Fremont-Smith (Arch Neurol and Psychiat 27 691 (Mar) 1932) has summarized in tabular form the necessary data to be obtained (see Table I)

METASTASES.—There is infrequent metastasis of brain tumors, but H Cairns and D S Russell (Brain 54 377 (Dec) 1931) report 8 cases in 22 autopsies of glioma of the brain with metastasis to the spine and other brain areas The metastases occurred from the astrocytomas and ependymomas which are comparatively benign, as well as from neuroepithelioma of the retina, medulloblastoma and glioblastoma multiforme There is possibly some relation between location and metastasis, particularly for those tumors lying close to the ventricles or cisternæ, where growth and expansion are favored

Two cases of *melanotic tumors* of the brain arising primarily in the meninges are reported by N C Foot and P Zeek (Am J Path 7 605 (Nov) 1931) In one case a small nodule was found in the choroid plexus, with considerable

metastasis throughout the meninges of the neuraxis In the other case there were 2 large tumors in the meninges with metastases to the lungs, which is very unusual

The frequency of occurrence of *metastasis* of tumor to the brain is considered as at least about 5 per cent by H F. Dunlap (Ann Int Med 5 1274 (Apr) 1932), the primary malignancy being in the lung, breast or kidney in more than 50 per cent of the cases The metastatic brain involvement might be a single nodule, varying in no respect symptomatologically from primary tumors found here, but when more diffuse, might present an encephalitic picture with mental changes On the other hand, the occurrence of multiple primary brain tumors occurs with a certain frequency

SURGICAL MORTALITY.—A report of the surgical mortality in a series of 2000 verified intracranial tumors has been written by H. Cushing (Arch Neurol and Psychiat 27:1273 (June) 1932) The report covers every death following operation from whatever cause and is summarized in convenient tabular forms as follows

TABLE II
ANNUAL STATISTICS OF OPERATIONS FOR VERIFIED TUMORS INCLUDING NEW AND OLD CASES FROM 1922-1931

Successive May 1 to May 1	Number of Patients	Patients Operated on	Number of Operations	Post- operative Deaths	Case Mortality, Per Cent	Operative Mortality, Per Cent.
1922-1923	104	94	130	22	23.4	16.9
1923-1924	156	140	190	26	18.6	13.7
1924-1925	137	113	142	21	18.5	14.7
1925-1926	155	133	172	25	18.8	14.5
1926-1927	184	161	217	24	14.9	11.0
1927-1928	185	149	183	28	18.7	15.3
1928-1929	205	179	226	26	14.5	11.5
1929-1930	178	147	191	24	16.3	12.5
1930-1931	200	170	219	15	8.8	6.8
Total	1504	1286	1670	211	16.4	12.6

TABLE III—A COMPARISON OF OPERATIVE MORTALITY FIGURES FOR THE ENTIRE SERIES WITH THOSE OF THE PAST 3 YEARS

New Cases July 1, 1928-July 1, 1931											
Entire Series (1902-1931)											
Intracranial Tumors											
Verified											
	No of Patients	Patients Operated On	No of Operations	Postoperative Deaths	Case Mortality, Per Cent	Operative Mortality, Per Cent	No of Patients	No of Operations	Post-operative Deaths	Case Mortality, Per Cent	Operative Mortality, Per Cent
I Gliomas	862	780	1173	202	25.9	17.2	198	282	31	15.7	11.0
Cysts undifferentiated	63	63	89	6	9.5	6.7	3	4	0	0.0	0.0
Differentiation impossible	74	61	88	12	19.7	13.6	4	4	2	50.0	50.0
Atypical and transitional	38	34	60	15	39.5	25.0	4	7	1	25.0	14.3
Astrocytomas	164	149	221	23	15.4	10.4	41	52	2	4.9	3.8
Cerebral	91	90	134	15	16.6	11.2	29	34	1	3.4	2.9
Cerebellar	208	153	272	66	36.1	24.2	73	120	17	23.3	14.1
Glioblastoma multiforme	18	16	26	3	18.8	11.5	8	3	0	0.0	0.0
Medulloblastomas	65	64	99	25	39.0	25.2	15	19	3	83.3	26.3
Cerebellar	35	31	58	10	32.2	17.2	7	10	1	14.3	10.0
Astroblastomas	32	31	46	8	25.8	22.2	7	12	1	14.3	8.3
Spongioblastoma polare	27	26	46	4	15.4	8.7	8	13	0	0.0	0.0
Oligodendrogliomas	6	6	11	2	33.3	18.2	0	0	0	25.0	25.0
Ependymomas	19	16	19	5	31.3	26.3	4	4	1		
Cerebral	14	6	8	6	100.0	75.0	0	0	0		
Cerebellar	3	3	4	2	66.6	50.0	0	0	0		
Pinealomas	2	1	2	0	0.0	0.0	0	0	0		
Ganglioneuromas	380	349	403	25	7.1	6.2	59	70	4	6.8	5.7
Neuro-epitheliomas	287	275	322	17	6.1	5.2	54	65	3	5.5	4.6
Chromophobe and mixed	73	71	51	8	11.2	9.8	5	5	8	20.0	20.0
Chromophile	271	260	489	54	20.8	11.0	69	108	2	11.6	7.7
Meningiomas	176	171	219	25	14.6	11.4	41	45	4	4.9	4.4
IV Acoustic tumors	113	106	160	23	21.7	14.4	17	25	1	23.5	16.0
V Coagential tumors	92	87	130	19	21.8	14.6	14	19	1	21.4	15.9
Cranio-pharyngiomas	17	13	15	3	23.1	16.6	3	6	1	33.3	16.6
Cholesteatomas	4	3	7	0	0.0	0.0	0	0	0		
Teratomas	2	2	4	0	0.0	0.0	0	0	0		
Dermoid cysts	2	2	4	0	0.0	0.0	0	0	0		
Chordomas	35	33	80	18	50.0	33.3	0	0	0	40.0	36.4
VI Metastatic and invasive	45	40	49	15	28.6	22.8	10	11	4	0.0	0.0
VII. Granulomatous tumors	31	30	37	17	37.5	30.6	4	5	0	0.0	0.0
Tuberculomas	12	10	14	0	30.0	42.9	0	1	0	0.0	0.0
Syphilomas	41	37	59	6	0.0	0.0	0	0	0		
VIII Blood vessel tumors	27	24	44	6	16.2	10.2	7	10	1	14.3	10.0
Hemangioblastomas	16	13	15	0	25.0	13.6	7	10	1	14.3	10.0
Malformations	14	12	17	6	0.0	0.0	0	0	0		
IX Sarcomas (primary)	12	11	23	3	50.0	35.3	0	0	0	0.0	0.0
X Papillomas	44	41	63	5	27.3	13.4	1	2	0	0.0	0.0
XI. Miscellaneous					12.2	7.9	6	9	1	16.6	11.1
Totals	2023	1870	2735	382	20.4	13.9	412	562	55	13.3	9.8
Unverified	859	496	557	12	2.4	2.2	66	73	0	0.0	0.0
Combined totals	2882	2366	3292	394	10.6	11.9	478	635	55	11.6	8.7

BRONCHIECTASIS.—TREATMENT.—It is pointed out by C McNeil (Brit M J 2 229 (Aug 6) 1932) that in bronchiectasis several morbid conditions are being dealt with, *i e*, bronchial catarrh, the retention of secretions in the bronchial dilatations, and fibroid change in the bronchi and adjoining lungs. The fibroid change is an incurable condition, but it is also rather more of a help than a hindrance in limiting bronchial dilatation. In the treatment, more cannot be hoped for than to reduce the size of the cavities and procure a regular emptying of their contents, in actual practice so much can seldom be achieved. These 2 objects may be attempted by medical and hygienic measures alone, or by adding to them more radical and surgical procedures. So far, the medical treatment of bronchiectasis must be described as ineffective. In most cases it has achieved only an amelioration of the symptoms, and its comparative failure has encouraged and justified the trial of bolder measures.

Of medical measures the most effective is daily **postural drainage**, the child lying on his face on a steep inclined plane for at least $\frac{1}{2}$ hour once or twice a day, and continuing this until there is marked reduction in the quantity of sputum. Some help may also be obtained from regular **spraying** of the nose and throat with **glycerin solutions**; this aids expectoration and prevents the reinfection of the bronchial surfaces from infected nasal and throat secretions. Among the expectorants, **belladonna** and **potassium iodide** sometimes help a little. **Inhalations** may also help in aiding expectoration but have not done more than that. **Vaccines** have been ineffective. In addition, the institution of good **hygiene, open-**

air conditions, prolonged rest, and simple respiratory and gymnastic exercises are of real value in promoting good nutrition and in maintaining the general health at a high level. Most cases of bronchiectasis respond quickly to such measures in the hospital, weight increases, while cough and sputum greatly diminish. When, however, the child returns home, the symptoms soon reappear. It is probable that better results could be obtained by far more prolonged treatment on the lines mentioned, especially if such treatment could be begun and continued at an early stage in the bronchiectatic condition.

So far, the reported results of bronchoscopic lavage and of the great variety of surgical treatments by way of the pleura and lung are not encouraging. The more drastic procedures which extirpate the affected area of lung are attended with a high mortality. Those that aim at producing collapse of one lung are confined to the unilateral cases, which are often of benign type with a fair standard of general health and a good enough expectation of life, and in which the existing fibroid change makes further collapse difficult to attain. Bronchoscopic lavage is a safer and more radical treatment, it is a direct attack on the real therapeutic problem of the dilated bronchi and their retained and septic contents. Its immediate results in older persons are often excellent, but there are difficulties in the frequent use of the bronchoscope in young children. It may be hoped that with improvement in the technic of bronchoscopy a real advance in the treatment of bronchiectasis will be achieved.

Operative Treatment.—Although improvements in methods of operating have been introduced in recent years, the operation remains even in the best hands

one of the most serious procedures in the surgical repertory, according to H. Ballon, J. J. Singer and E. A. Graham (J Thoracic Surg 1: 502 (June) 1932). From a list of collected operations performed by different operators and by different methods, it is hardly fair to draw precise conclusions concerning the operative mortality and the probable chance of a satisfactory result. Yet the fact remains that in 212 collected cases no less than 72 patients (34 per cent) died apparently because of the operation and apparently in only 99 (47 per cent) was a thoroughly satisfactory result obtained. Even if only the more recent and the more favorable figures are taken it will still be found that a patient with bronchiectasis who submits to a lobectomy runs about a 15 to 20 per cent. risk of dying because of the operation, and that if he recovers from the operation he has only about a 65 per cent. chance of having a thoroughly satisfactory result with solid healing of the wound. In presenting this aspect of the results of lobectomy, the authors point out that there is no intention to be destructive or to argue that the operation is too dangerous or too uncertain in its results to be justifiable. On the contrary, much satisfaction should be gained from the fact that so many patients have been made well; for probably most of those who have obtained satisfactory results have been saved from death due to the natural consequences of the disease, and most of those who have died as a result of the operation would have died if left untreated.

BRONCHITIS, SUN.—As pointed out by K. Klare (München. med. Wchnschr 79: 795 (May 13) 1932) the different constitutional types react differently when exposed to the sun. Whereas

dark people generally feel no ill effects from solar irradiation, light persons often show unfavorable reactions. These reactions became manifest even in the form of febrile bronchitis on numerous children who underwent heliotherapy. The children in whom this form of sun bronchitis develops usually are the exudative lymphatic type. They are usually of light complexion, but of especial importance seems to be also a slight reddish tone in the color of the hair. The skin of these children reacts to sunlight exposure not with pigment formation, but rather with inflammation and burning. However, it is not so well known that the irritation by the sunlight may also cause an inflammation of the mucous membrane of the upper respiratory passages. The cause of this reactive inflammation is as yet not fully understood, but it may be due to the decomposition of proteins. In children with exudative lymphatic diathesis, exposure to sunlight should be done with great caution. This warning is necessary particularly at the present time, when natural and artificial heliotherapy is often employed without discrimination.

BRONCHUS. — BENIGN TUMORS.—(On the basis of a study of 17 cases H. Wessler and C. B. Rabin (Am. J. M. Sc. 183: 164 (Feb.) 1932) seek to define a clinical picture of benign tumors of the bronchus. Their study was concerned mainly with that form of tumor known as *adenoma*, which appears to be the commonest type encountered clinically. The following facts are emphasized: (1) care must be exercised in the microscopic diagnosis of these tumors lest they be mistakenly regarded as malignant; (2) benign tumors of the bronchus probably have a long

period of latency during which there may be no symptoms of bronchial obstruction or bronchial irritation; (3) in a considerable percentage of the cases this period is characterized by repeated hemorrhages, (4) aside from the symptoms of bronchial obstruction and infection, pulmonary hemorrhage is a frequent symptom of adenoma of the bronchus. This bleeding has certain characteristics which may suggest the diagnosis, (5) when stenosis of a bronchus

with infection of a lung has occurred, the clinical picture may be confusing, (6) the prognosis of benign tumors of the bronchus depends, as has been frequently emphasized, on the early discovery and removal of the tumor, which may lead to prompt cure. When secondary inflammatory changes have occurred in the lung, the outlook is not good, (7) evidence indicates that polypoid adenomas may undergo malignant degeneration.

C

CALCIUM.—ADMINISTRATION AND DOSE

—In a study of the comparative pharmacologic effects of various calcium salts administered orally, intramuscularly and intravenously to human beings and dogs, A. L. Lieberman (J. A. M. A. 97:15 (July 4) 1931) pointed out several important findings regarding calcium gluconate. According to the author, this compound can be given in repeated and adequate amounts subcutaneously without causing either irritation or necrosis. The proper dose for an adult apparently was 3 or 4 Gm ($\frac{3}{4}$ to 1 dram) a day after meals and the blood calcium attained to its maximum elevation within 1 hour after subcutaneous or intramuscular administration of the calcium gluconate, and within 4 hours after being given orally. Urinary calcium appeared to be a qualitative index of the state of the blood calcium level. Whether this is true in all pathologic conditions remains to be seen, but a urinary value of about 10 to 20 mg an hour appears to be most desirable in avoiding either a hypercalcemia or a hypocalcemia. Lieberman is of the opinion that intravenous calcium therapy is dangerous because of

the menace of sudden intravascular clotting and death.

In another study A. L. Lieberman (J. Pharmacol. and Exper. Therap. 42:245 (June) 1931) has determined that peroral administration of calcium gluconate in humans will raise the calcium of the blood provided there is no gastrointestinal upset accompanying the ingestion of the material. Other things being equal, it will apparently absorb a little better on an empty stomach, provided the calcium gluconate in the doses given does not induce a peristaltic rush. Because food has a tendency to diminish this hyperperistalsis, it is deemed advisable by Lieberman to administer the calcium gluconate, especially when in large doses, after a meal. In general, the action of calcium gluconate (as judged by the elevation of the blood calcium) is more prolonged when administered orally after the ingestion of food. The results obviously suggest, in the author's opinion, that calcium gluconate be given in fractional doses after a meal in order to minimize the "salt" action of the medicament.

Through the intravenous administration of calcium salts the blood suffers

only a transitory increase in calcium concentration, according to G D Greville (Biochem J 25 1931, 1931), for the blood calcium sinks rapidly, returning usually within 2 hours of the injection to its original level. Experimental work conducted by Greville showed that the serum calcium, as determined by direct precipitation, can give an accurate measure of the calcium content of the blood following the intravenous injection of calcium levulinate. Following the intravenous injection of calcium chloride and of calcium levulinate into cabbaged-fed rabbits, it was found that the rate of fall of serum-calcium at any time greater than 5 minutes after the injection, was approximately proportional to the excess at that time of the serum-calcium above the final constant level. In addition, there was a large disappearance of serum-calcium during the first 5 minutes not accounted for by this relationship.

PHYSIOLOGICAL ACTION.—

In discussing calcium metabolism, H A. Bulger and D P Barr (Ann Int. Med 5 552 (Nov) 1931) state that the influence of the parathyroid glands on calcium metabolism is apparent not only after removal of the parathyroids and the administration of parathyroid extract, but also in clinical hyperparathyroidism, a condition which appears most often in association with osteitis fibrosa cystica, and with multiple myeloma and metastatic tumors of bone. According to the authors, the level of serum calcium is the best index of parathyroid function and is of such diagnostic importance that its use as a test should be applied in all cases with general disease of bone and in all conditions in which there may be a disturbance of calcium metabolism. The serum calcium, however, does not always reflect

either disturbances of calcium metabolism or changed activity of the parathyroid glands. It may be normal even with marked disturbances of calcium metabolism. In evident hyperparathyroidism, it appears that serum calcium may occasionally be within normal limits. Low serum calcium may be due to a lack of vitamin D or to an increase of phosphate in the serum. These conditions, however, are not likely to be confused with hypoparathyroidism. Hypercalcemia usually indicates an increased activity of the parathyroid glands.

Absorption.—A quantitative method of estimating the relative intestinal absorption of different calcium preparations has been devised by F Wokes (J Pharmacol and Exper Therap 43 531 (Nov) 1931), making use of the property of calcium of neutralizing the narcosis produced by magnesium. Application of the method showed that the most readily absorbed calcium salt is the chloride. The chlorate had about nine-tenths of the value of the chloride, and the lactate about seven-tenths. The gluconate shows very poor absorbability and a mixture of oleate and levulinate was little better. Addition of sodium lactate to calcium lactate, in equimolecular proportions, increased its absorbability to nearly that of the chlorate.

THERAPEUTICS.—The influence of a cereal-free diet rich in vitamin D and calcium on dental caries in children was investigated by M Mellanby and C L. Pattison (Brit M. J 1 507 (Mar. 19) 1932). Such a diet was given to 22 children whose teeth were fully erupted, for the most part badly formed, and often carious before the investigation was begun. The average period of maintenance of the diet was 26 weeks and the average age of the chil-

dren 5½ years Their results indicated that the initiation and spread of caries were almost eliminated by such a diet, and the results were better than those of any previous investigation in which the vitamine D alone was increased in a diet containing bread and other cereals Active caries was also arrested on this cereal-free diet to a greater extent than in the previous investigations when cereals were extensively used The authors emphasize, however, that the tests, of course, do not indicate that in order to prevent dental caries children must live on a cereal-free diet, but, in association with the results of other investigations on animals and children, they do indicate that the amount of cereal eaten should be reduced, particularly during infancy and in the earlier years of life, and should be replaced by an increased consumption of milk, eggs, butter, potatoes and other vegetables

E Podolsky (West Virginia M J 28 23 (Jan) 1932) reports good results in the treatment of *vasomotor rhinitis* with *calcium gluconate*, and in certain cases of *asthma* he found that calcium in conjunction with other appropriate remedies exerts a very remarkable effect Calcium gluconate, 60 grains (4 Gm), by mouth 4 times a day to start with, was the régime employed, At the same time, *ephedrine sulphate* in ⅜ grain (0.024 Gm) doses was administered every 4 hours For the very severe and very frequently recurring paroxysms, intramuscular or intravenous injections of calcium may be given At the same time the oral administration of calcium should be continued It has been found that in those patients in whom the calcium is being maintained at a high level by the various routes of administration, emergency uses of *adrenalin*, to relieve bronchial spasm in

asthma, is not so often necessary, and when necessary it can be given in smaller doses

CANCER. —ETIOLOGY.—E W Saunders (Ann Surg 95 327 (Mar) 1932) reviews a bacteriological, clinical and serological study of 41 identical strains of streptococci isolated by an anerobic tissue culture from 24 resected ulcers of the stomach, 5 of which were carcinomata, 3 from ulcerative colitis, 2 from carcinomata of the rectum, 8 from carcinomata of the uterus, and 3 from carcinoma of the breast This strain of organism proves identical to the *Streptococcus lacticus* found commonly in cow's milk

The specific agglutinins were found in the blood stream in all cases of gastric ulcer, whereas in cases of other streptococci, agglutination failed to occur or did so only in low titer The diplococcus of Bargaen from ulcerative colitis is identical A vaccine and filtrate of the organisms isolated from 3 inoperable breast cases of carcinomata gave positive sensitizing tests

H E Eggers (Arch Path 12 983 (Dec) 1931, 13 112 (Jan) 296 (Feb) 462 (Mar) 1932) reviews in great detail the etiological factors of tissue transplantation and parasitism, irritation and metabolic features of carcinoma

Considering the possible etiology of cancer from the standpoint of *parasitism* from the intrinsic evidence alone, omitting the reference of cancer to chronic irritation, the author believes that all the work done in search of a specific causative parasite has been "a chase of the will-o-the-wisp" No parasite so far mentioned has withstood the careful scrutiny of reinvestigation Some of the helminths have been known to

cause cancerous growths, but how much influence the factor of chronic irritation plays is not yet known.

No doubt can be cast upon the statement that there is an agency capable of release from the cell, which under suitable conditions is capable of inciting malignant growth. Evidence seems to prove that it is not an independent form of life, nor in that sense a living organism, but to view it as a product of cellular metabolism which can, in turn, excite metabolic reactions which give rise to it, does little to afford any light as to its real nature.

In spite of the evidence that parasites may cause tumors, there is little foundation to the statement that parasitism plays an important part in the formation of human tumors. Although there are instances in the literature in which there has been an apparent transmission of cancer from one individual to another, these instances are the exception rather than the rule, and they give little strength to the parasitic theory of neoplasms.

Irritants important in the causation of cancer may be: (1) chemical; (2) physical, or (3) infectious. The irregularity with which neoplastic growth follows their action is probably dependent upon: (1) the agents themselves and (2) the variation of the neoplastic response to the individual. The mode of action of these irritants is as yet not definitely known. Theories ranging from the liberation of lactic acid for the abnormal metabolism of tumor cells to the increased metabolic activity, due to an accumulation of sulphhydryl compounds, have been advanced to explain this theory or factor of irritation.

An outstanding feature of the irritations in their induction of cancerous growths is the additive effect. Beren-

blum has shown that tanning and freezing with carbon dioxide snow, simultaneously, all together resulted in inhibition of tumor growth, but when they act together, but at different times, there is a decided additive effect. Apparently the exact nature of the irritant is unimportant so long as its cancerous effect is present and acts at no time in too great intensity.

With practically all irritants, *age* seems to play a role greatly subordinate to its usual rôle in cancer formation. Woglom believes this is merely the result of giving sufficient time for the development of cancer from some previous irritation.

From the author's opinion, it would be necessary to explain cancer as a result of *metabolic anomaly* by which the involved cells achieve the property of unlimited and unrestricted growth as the result of perversion of their normal functional and nutritive relations. In part, it is looked upon as a diversion of the normal expenditure of energy of the cells from its miscellaneous functions to the one of demand of reproduction. In some instances of malignancy of the endocrine glands there is a persistence of the functional activity of the cells in spite of an excessive expenditure of energy in cellular reproduction. Many factors appear to contribute to this cellular activity, such as inherent growth energy, achieved growth energy, heredity predisposition and secretory or endocrine imbalance.

The mechanism of *metabolic aberration* is explained by an ingenious theory, containing much speculation and little actual knowledge. It has been ascribed to the action of the neorhormones—growth stimulating substances liberated from dead and dying cells, to hormonal imbalance, and to the interaction of a

growth by restraining principle to regulate cellular reproduction

The work of Warburg has definitely established the fact that abnormally excessive carbohydrate cleavage is the source of the extra supply of energy necessary for excessive cellular growth. Along with this there are lowered surface tension, increased cell permeability, abnormal lipoidal relations, electrical reactions and response to calcium salts, as well as added intracellular water content.

The unique character of transmissible sarcomata of fowl and their possible relationship to the filtrable viruses has been the subject of a number of contributions from J B Murphy and his coworkers (E Sturm, A Claude, O M Helmer and F L Gates J Exper Med 55 441 (Mar), 56 91, 117 (July) 1932). He has recently investigated the problem by comparing the effect on this tumor of ultraviolet light, plotting the units of energy required to kill or inactivate, compared with bacteria and typical viruses. He found that not only was the plotted curve different in the case of the tumor, but the units of energy required were hundreds of times greater. He also indicated that the chicken sarcoma agent is adsorbed and fixed *in vitro* by mesodermal tissues of susceptible fowls, but not by similar tissues from nonsusceptible animals. In addition, he was able to remove an inhibitory substance from extracts so that the resultant material was more active than the original.

He formulates an interesting hypothesis which would indicate that the injected material contains an agent "capable of conferring the peculiar type quality to undifferentiated cells of the same species which, in turn, may produce the active factor and transmit this

to their descendants." He suggests the term "*transmissible mutagens*" to agents such as these described, as well as those responsible for type specificity in pneumococci.

PATHOGENESIS.—J J M Shaw (Lancet 1 221 (Jan 30), 273 (Feb 6) 1932) regards carcinoma as a growth of cells which have either failed congenitally to come under those influences which determine cell function and form or which, after being subject to such differentiation, have become independent of them owing apparently to a prolonged change in the environment.

To Shaw, the possibility of lawlessness or "vagarious action" on the part of a living cell at once renders the discussion of causation entirely sterile. To him the cell is primarily an individual and secondarily a citizen. The persistence of the cell life several days after somatic death proclaims a capacity for survival of such cells in a disjoined state. The capacity for growth should not be regarded specifically as a specialized function or as an alternative to other functions.

The author describes in considerable detail three different methods of production of carcinoma: (1) *implantation*, in which a living carcinoma is transferred from one host to another without apparent modification in growth, (2) *continuum*, in which an embryonic cell growth fails to come under the influence of the mechanism of differentiation and continues to grow in its natural primitive state and to reproduce in the manner of undifferentiated multicellular organisms; (3) *conversion*, in which a single differentiated cell or cell group becomes altered under some change in environment, so that its previous differentiation and specialization disappear or become modified.

Observations by S P Reimann (Am J Cancer 15 2149 (July) 1931) have led to the recognition of the significant role of the *sulphydryl group* in cell proliferation. Two fundamentals must be appreciated, *viz*, (1) SH is a naturally occurring chemical group in cell division, and (2) cell proliferation is regulated by an equilibrium between chemical compounds in which SH is the key group. This is unique in that it depends on changes in valence, oxidation, reduction and hydrolysis of extremely labile chemical groups revolving around the element sulphur.

Since the SH group has been demonstrated to occur in the nuclei of the dividing cells, it follows that offering SH containing compounds to proliferating cells will increase the rate of cell division unless their nuclei are supersaturated with sulphur. The work of Hammett has proven this fact and the later work of Voegtlin and Chalkley, using glutathione as the sulphydryl compound, has shown that even the lowly ameba responds. This fact has been applied practically in the Lankenau Hospital to accelerate healing of stubborn ulcers, bed sore and the like.

Practical application of this principle has led to serious thought regarding the relations between this stimulated cell division and malignancy. The question immediately arises, "Can normal cells be forced by a normal stimulus to become cancer cells?" The rhythmic growth and regression of the epithelial and connective tissues of the normal female breast during the menstrual cycle is used for an example. The differences between this and neoplastic changes are best observed by studying the parts.

(a) In cell division of cancerous tissue there is no difference in the mitotic figure of these and normal cells.

(b) "Differentiation" is the name given to the process of maturation of the cells taking on a special characteristic. The cells of malignant tissue differentiate to all degrees except perfection. They do not form adult normal cells.

(c) Organization is defined as the orderly, mutually considerate growth of two or more tissues to form a part. In carcinoma the epithelial tissue determines the growth of the stroma.

Tumors cannot arise from completely differentiated adult cells because, if normal division takes place in a completely differentiated cell, the qualitative composition of the chromosomes is quantitatively equally divided among the two resulting daughter cells. These daughters inherit a perfect chromosome complex from the mother cell which had perfect chromosomes or it could not have differentiated perfectly. Therefore, malignant tumors must arise from poorly and incompletely differentiated cells, the chromosome complex of which is qualitatively altered as to the differentiation and organizing factors.

The conclusion is therefore reached that certain strains of cells by heredity contain chromosomes of a chemical composition less stable than others. This instability is followed finally by a change in the chemical composition sufficient to result in an increased susceptibility to the stimulus of cell division and to altered differentiation and organization. This latter acquired characteristic is then transmitted to the succeeding generations of cells.

A review by S P Reimann (Am J Clin 5 421 (Sept) 1932) of the subject is as follows.

1 "All living multicellular organisms increase the number of their cells by a process of cell division.

2 As the cells increase in number, they are differentiated and organized into the morphology and functional characteristic of the species and the parts

3 The number, differentiation, and organization of cells produced in the majority of species is limited by the organism itself, not only in the total primary cells, but also in those produced secondarily for repair, regeneration, etc

4 In tumors of whatever kind, the number of cells is increased. The equilibrium is disturbed in degrees from slight to complete. Differentiation and organization are diminished in degrees from slight to complete

5 There are authentic cases on record in which even malignant tumors have been held in check or have even disappeared through agencies within the organism itself. Many more cases are known, in fact are encountered every day, in which recurrence of tumors has been checked from within for many years after removals which have failed to remove all of the cells "

In view of these facts, rational plans for the future control of this dread disease are obvious. There seems to be no need to state that when control of inanimate nature is accomplished, it is usually by way of physics and chemistry

W. Karnicki (Nowotwory (Neoplasmes) 6: 98, 174, 1931) investigated 8 series of experimental rabbits, besides the control series, in order to determine the relation between the *internal secretions* and experimental carcinoma. Gas tar was used as an irritant. The rabbits in this series were subjected to: (1) thymusectomy, (2) thyroidectomy with unilateral parathyroidectomy, (3) testectomy, (4) unilateral suprarenalectomy, (5) thymusectomy combined with testectomy, (6) implantation of thymus

and testes, (7) experimental carcinoma plus injections with extracts from the previously excised glands, and (8) hypophysectomy. The animals of the eighth series did not survive the operation. The results reported by the author were as follows:

1 The glands of internal secretion have an influence on the genesis and development of experimental carcinomata in rabbits

2 Thymusectomy accelerates the appearance of experimental tumors in the relation of 4 to 1

3 Thyroidectomy with unilateral parathyroidectomy hastens also the formation of tumors in the relation of 3 to 1.

4 Testectomy produces less acceleration than thyroidectomy with unilateral parathyroidectomy and considerably less than thymusectomy

5 After unilateral suprarenalectomy there is a marked retardation of both the appearance and the growth of tumors

6 The acceleration of the appearance of tumors after thymusectomy combined with testectomy in the same animal is marked

7 Implantation of thymus and testes considerably retards the appearance of tumors

8 Injections of extracts from thymus and testes cause dehydration and breakdown of tumors, also shrinkage of the larger nodules and destruction of the smaller ones. The large nodules soften in the later phases of the injection periods

PATHOLOGY.—G. A. Hellwig (Arch. Path. 14: 517 (Oct.) 1932) reaffirms Reimann's statement that pathologic interpretation of tissue is composed of about 90 per cent art and 10 per cent science. Virchow's opinion that it is impossible to recognize a tumor

cell under the microscope still holds today. Some investigators believe that nuclear behavior, size and number of nucleoli, loss of chromosomes, unequal nuclear division, hypertrophy of chromatin and changes of the microcentrum are characteristic of tumor cells. Today the majority of observers do not hold these points as the universal foundation or guide-posts for the diagnosis of neoplasm.

The work of Warburg confirms the opinion of histologists that there are no principal, but only gradual, changes and differences between benign and malignant tumors. Roffo's claim that hydrogen ion concentration in the tissues permits or excludes a diagnosis of cancer was refuted by Bottin.

The study of experimental cancer has also failed to establish reliable cytologic criteria of malignancy. Even the earliest work on the production of the tar cancer on animals has shown from the microscopic standpoint that the chromosomes are normal and that irregular mitoses are secondary changes, due to excessive cell proliferation.

Hellwig refers to the work of Quensel on the pleural and ascitic fluid. The latter points out that there is no general cytologic formula which can be applied in all cases, because the number and form of the tumor cells vary greatly. The picture depends upon the nature of the primary growth and on that of the malignant process in the serous cavity. He states there is considerable variation in the number of cells in the fluid. Scirrhus cancers show very few, while the fluid in a case of medullary carcinoma may have very many. As a most important characteristic of tumor cells, Quensel found large size, increased number, and irregular form of the nucleoli.

Few authors today rely on the cytologic diagnosis in examining surgical specimens. Babes recommended that in suspected cancer of the uterine cervix cell smears be taken and examined in place of diagnostic specimens, the excision of which, he regarded as too dangerous. In the hands of Babes this method gave positive results in 18 out of 20 cases.

No morphologic method can decide whether a noncarcinomatous atypical cell proliferation will actually develop into cancer or prove to be entirely harmless. The deciding factor is apparently an individual predisposition the nature of which is completely unknown. The study of experimental cancer has not offered any histologic criteria for deciding whether a precancerous tar papilloma will be followed by a malignant growth or remain self-limited. Ewing favors the theoretical conception of a precarcinomatous stage of epithelial proliferation passing by insensible gradations to the fully developed malignant cells, but in practice he regards changes without signs of malignancy as benign. The author cites the reports of numerous observers who have found leukoplakia as a forerunner of malignant growths.

There seems, according to the author, to be a wide difference of opinion regarding the possible transformation of a chronic gastric ulcer into a carcinoma. Figures varying from as low as 3 per cent to as high as 71 per cent. have been reported. Exhaustive studies have also been made of polyps of the stomach with their relation to malignant degeneration. In the opinion of the author, in spite of all the work that has been done, there will never be a definite decision reached concerning the relation of chronic cystic mastitis to malignancy.

until sufficient observation is given to nonradically treated cases

The word "precancer" to the author is meaningless. Using biopsy as a method of diagnosis, either the pathologist should take the full responsibility by pronouncing the lesion malignant or benign, or he should have the courage to admit that he does not know and leave the responsibility to the clinician or to a more experienced histologist.

From the time when microscopes first were used, the tissue experts have formed from their histologic observations an opinion of the progress of a neoplastic process. In 1915, Ewing stated that in many instances the potential malignancy of a tumor may be judged with accuracy from its histologic structure, but its actual clinical course may be subject to numerous variations, depending on age, location, size and duration. Five years later, Broders aroused the interest of surgeons and pathologists by announcing that the clinical course of many cancers could be predicted by an analysis of the histologic structure alone, without taking the clinical factors into consideration. He based his opinions on the assumption that the more highly differentiated the cells are, the lower is the malignancy of the tumor. While Ewing followed this principle for some time, Hueper used 4 principal criteria for his estimations, *i e*, (1) special cellular and structural changes, (2) characteristics of the cytoplasm, (3) characteristics of the nuclei, and (4) characteristics of the stroma. He emphasized the fact that the grading of histologic malignancy should not be the only factor on which to base the type of treatment or estimate the prognosis.

Cause of Death.—The immediate cause of death was studied in 500 cases of carcinoma coming to autopsy, by S.

Warren (Am J M Sc 184 610 (Nov) 1932). *Cachexia* was the most frequent single cause, although exceeded by the total of the various *pulmonary disorders*, and was associated most frequently with cancer of the breast, stomach and large bowel. By far the commonest cause of death in carcinoma of the cervix uteri was *renal insufficiency*. Sepsis was an unimportant factor in fatal cases. The striking association of carcinoma of the buccal mucosa with *pneumonia* (36.2 per cent) and with lung abscess (53.6 per cent) emphasizes the rôle of aspiration in the production of these lesions.

PROGNOSIS.—In 1930, Wood stated that no one can make a prognosis from a microscopic section save in certain well recognized groups of tumors. He regarded malignancy as a clinical phenomenon rather than a morphologic one. The prognosis of a neoplasm to him depends on many things: on the position of the growth, its relation to blood-vessels, its size in some cases, and the dimensions of the tumor cells wholly independent of their rate of growth. In spite of the encouragement given by Ewing, Wood and Plaut to the further investigation concerning the grading of tumors, Reimann regards it as futile to decide from a small section of a tumor what will happen to a patient with cancer. If a prognosis is to be made at all, the presence or the absence, and the situation of the secondary tumor deposits are of greater importance than the histologic grading. This problem of grading is further complicated by the fact that tumors of the same histologic structure, but in different locations, may have entirely different grades of clinical malignancy. Also, according to Hellwig (*loc cit*) there is considerable uncertainty of present histologic methods.

in differentiating the earliest stages of carcinoma from harmless atypical cell proliferations

In spite of the larger volume of work which had as its inception the inspiring work of Broders on the grading of malignancies, it must be said that the problem is far from being solved and that its practical value is still very limited. The present knowledge of the relationship between histology and prognosis has been summarized by Barnard: "A competent histologist can say of a tumor that it is a type which grows rapidly or slowly, and he may be able to add that it is a type which usually metastasizes early or late in its growth. But it is not yet within his power to draw a graph of malignancy indicating the expectation of life to be associated with each shade of variation to be found in malignant tumors

TREATMENT.—Modern radiotherapy is based upon the fact that neoplastic cells have a greater radiosensitivity than resting tissue cells, according to Hellwig (*loc cit*). Knowledge concerning the relationship between histologic character and response to radium is as yet limited.

Recent histologic observations on irradiated tumors seem to prove that irradiation acts by direct destruction of the malignant cells. The earliest process to be noted after irradiation is a cessation of mitosis of the cells, then the nuclei of the cells reveal evidences of degeneration, and, finally, the entire cell becomes necrotic. Some observers have found an actual proliferation of the connective tissue as a result of irradiation. In a study of clinical radiosensitivity 2 distinct phenomena are involved. They are the primary regression of the tumor and the actual cure. Ewing has observed that the response to irradiation

usually runs parallel to the degree of anaplasia and potential malignancy but by no means always. As a rule, the more adult the cell type, the more active is the stroma and, on the other hand, the highly anaplastic and rapidly growing tumors excite little stroma reaction and may be completely destroyed by external irradiation. Vascularity is considered by Ewing as a very important factor, as these tumors have been seen to almost melt away because of the destruction of the blood-vessels.

Observations that the untreated cases of inoperable carcinoma suffer from alkalosis led to the work of many investigators in the development of a self-induced acidosis. Notable among the workers in this field is Willy Meyer (Am J Surg 15:112 (Jan) 1932). This acidosis may be developed by fever, by Coley's fluid, by starvation, by artificial hyperemia, by induced inflammation and by the administration of parathyroid extract, of calcium, acids, or other drugs. He believes such a régime should be put into operation as quickly and completely as possible. He also states that the biologic acidosis treatment of inoperable malignancy must be worked out further by cooperative efforts of the members of the medical and affiliated professions. The author considers that those workers who are following this conception of beneficial results from the acidosis therapy are bending their efforts in the right direction.

Comparison of the results of a combination surgical and radium therapy, with the results of exclusive radium therapy convinced L. Arzt and H. Fuhs (Wien klin Wchnschr 45:15 (Jan 1) 1932) that in *carcinoma of the skin and lips* these 2 methods are of about equal value. Although it might seem sufficient

to use radium alone, the authors have employed the combined treatment due to the fact that exclusive radium treatment not only requires much more time, but also necessitates the use of greater doses of rays, the latter being an important factor when the quantity of radium is limited. The authors favor the use of the diathermic loop in preference to the knife for removal. Only in carcinomas of the lip did the author find the radium treatment to be the method of choice.

S Russ (Lancet 1 874 (Apr 23) 1932) classifies the actions of the gamma rays and the x-rays as follows (1) those which interfere with or disorganize the delicate processes involved in the division and maturing of cells, (2) those which determine the release into the tissues and into the circulation of the products of cells, normal as well as malignant, whose destruction is caused by rays, and (3) those which produce changes not only in the content and production of the blood, but also in its power of dealing with infection.

A Lang (Beitr z klin Chir 155 67 (Mar 16) 1932) advocates the use of radium in such localizations and in those stages of cancers in which surgical interventions are impossible or will give less favorable results. To him radium therapy is especially helpful in *cancer of the oral cavity*. He also believes that in lesions of the *nasal cavity*, the *larynx* and the *palate* where surgery is not only difficult, but dangerous, radium has proven helpful. He stresses the use of small quantities of radium and believes the surgeon can use radium to a better advantage than the irradiation specialist, for the reason that the former is better able to place the substance more favorably for its action upon the neoplastic tissues.

A Zuppinger (Strahlentherapie 43 701 (Apr 13) 1932) reports 20 cases of malignant tumors in which the prolonged fractional x-ray treatment was employed and in all of which the patients have been symptom-free for more than a year. In 19 of the cases the diagnosis was verified by histologic examination, 18 of the tumors being carcinomatous and the other was a sarcoma. These tumors involved all portions of the upper respiratory and gastrointestinal tracts and only 4 were considered at all amenable to surgery. The total dosage used was determined by the results, for irradiation was continued until in the region of the pavement epithelium an uninterrupted layer of fibrin had formed.

The authors found that prospects for recovery are largely dependent upon the extent of the regional metastasis, on the size of the primary tumor, on the patient's general condition, and on the histologic structure of the tumor. He emphasizes that fractional x-ray therapy is not a cure-all, but is advisable in tumors of the mucous membrane consisting of pavement epithelium in which the use of the radical operation is not considered advisable because of the location of the neoplasm.

G F Pfahler (Monthly Bull Pub Health, Philadelphia (Jan-Feb) 1932) makes the hopeful and encouraging statement that much progress is being made in the knowledge of the causation, nature and prevention and the cure of cancer. He believes the profession should all unite (1) in using the knowledge now available; (2) in concentrating cases for observation, (3) in recording and analyzing carefully clinical observations, and (4) in appealing for more research funds for a greater effort in the cure of this dread disease.

Cancer never begins in healthy normal tissues and so far as it is possible to cure or eliminate abnormal tissues in the body, will the physician be able to cope with malignancy. The author states, the fact that there is a great lack of knowledge about the origin and cure of many cancers is no excuse for not utilizing the knowledge now available in preventing certain groups of cancers. He makes a plea for the removal of pre-cancerous lesions or those which are known at times to degenerate into cancer.

The conclusions of Thomas Lumsden, quoted by the author, are as follows:

1 Antimalignant cell bodies lethal to cancer cells but harmless to normal tissue cells can be produced.

2 When implanted tumor already established in the body is gradually destroyed by injecting antiserum or formalin into it, active immunity against the tumor is induced by a mechanism which may be called autovaccination. It is still to be discovered whether or not similar results can be obtained in the case of spontaneous tumors.

Lead Therapy.—During the past 2 years at the Mayo Clinic (A. E. Osterberg, B. T. Harton, J. A. Bergen and F. W. Rankin. Proc. Staff Meet., Mayo Clinic 7:231 (Apr. 20) 1932), 95 patients with inoperable carcinoma received lead therapy, based on the theory of Blair Bell. Only 48 of these, however, received what is considered an adequate lead treatment (400 mgms— $6\frac{1}{8}$ grains—of metallic lead) or developed an active lead intoxication, since 17 were in such poor condition at the time the treatment was instituted that they received only 1 injection of lead and 30 were in such poor general condition that they could withstand but 2 injections.

Twenty-six of the 48 adequately

treated patients are now dead. The maximum amount of lead administered to one patient in this group was 633 mgms ($9\frac{3}{4}$ grains) and the minimum 569 mgms ($\frac{9}{10}$ grain). 16 had received radium or x-ray treatment, or both, in addition to the lead. These patients lived from 5 to 400 days after completion of the treatment, in 16 there was marked symptomatic improvement for a time following the administration of lead evidenced by relief of pain, increase in appetite and gain in weight and strength. Lead appeared in the urine of 1 patient after receiving 14 mgms ($\frac{1}{4}$ grain) and of another not until after 400 mgms ($6\frac{1}{8}$ grains) and in both instances the urine was negative prior to intravenous injection of the lead preparations. Stippling of the erythrocytes was observed in 1 case after $\frac{1}{4}$ mgm ($\frac{1}{4}$ grain) and in a second case after 400 mgms ($6\frac{1}{8}$ grains). Nine of the 26 had delayed symptoms of chronic lead intoxication. The following organs were involved: breast in 5 cases, stomach 3, colon 3, ovary 2, cervix 2, extremities (myosarcoma and fibrosarcoma) in 2, and bladder, palate, retroperitoneum, glands of the neck, prostate gland, thyroid gland, antium, tongue and kidney in 1 each.

Twenty-two patients of the series are still alive 6 months to $2\frac{1}{2}$ years after treatment. All but 2 of these manifested toxic symptoms from the lead, 9 having exhibited severe plumbism. The type of reaction is differentiated into immediate and late, among the immediate symptoms are acute backache, pains in the joints, chills, rising fever, urticaria and acute pain in the tumor, while the late reactions are listed as severe abdominal colic, pain in the arms and legs, loss of weight, anorexia and vomiting. The objective signs of lead

intoxication are anemia, basophilic stippling of the blood and albuminuria. In no case was there the so-called lead line on the gums and there was but one case of lead encephalopathy. The average amount of lead given to the 22 surviving patients (371 mgms— $5\frac{3}{4}$ grains) was greater than the amount given to the patients who did not survive, and the maximal amount given to one patient was 800 mgms ($12\frac{1}{4}$ grains). In this group the growth was in the breast in 8 cases, in the pelvic organs in 4, the lower extremities in 2, and in the stomach, rectosigmoid, jejunum, abdominal wall, kidney, antrum, Bartholin's gland and thyroid in 1 each, 18 of the lesions were adenocarcinomas, 2 were squamous-cell epitheliomas, 1 a sarcoma, and 1 a menaloepithelioma.

In 13 cases, there is some carcinoma remaining, but the patients are free from pain and leading a comfortable existence. The remaining 9 patients, after 8 months to $2\frac{1}{2}$ years, are apparently free from carcinoma, 8 of these had symptoms of lead intoxication and 5 severe plumbism. In addition to the administration of lead, associated treatment included surgical excision of part of the tumor, calcium in the form of chloride or lactate, an elimination diet, and efforts to produce acidosis following the suggestions of W. Meyer (Am J Surg 15 112 (Jan) 1932).

For this treatment, only those patients were accepted who could not have been better treated by surgical measures, radium, etc., and the results appeared more satisfactory in cases of superficial carcinoma, such as of the breast, sarcoma of the extremities, epitheliomas of the neck, etc., than in lesions of the hollow viscera. Of the 9 living subjects who are believed to be free from recurrence, 4 had carcinoma of the breast

and were treated by lead alone, *ie*, there was no irradiation, but the breasts had previously been extirpated surgically and recurrence was treated by the intravenous injection of lead phosphate, with complete disappearance of the lesions. It is believed that with intra-abdominal carcinoma, if treated at all, lesser amounts of lead should be used than in the case of carcinomas near the surface.

Study of this series of cases indicates that (1) the dosage must be carried to the point of toxicity in order to be effective, (2) there is a definite local effect of the lead on the malignant tissue evidenced by pain, increase in size, vascularity, etc., and (3) carcinomatous tissue does mobilize lead. It is concluded that lead therapy as a means of controlling carcinoma may be considered optimistically but without too vigorous enthusiasm.

CARBON DIOXIDE.—In commenting on his observations on the use and abuse of carbon dioxide in anesthesia, D. G. Renton (M. J. Australia 1 121 (Jan 23) 1932) points out that this agent is a very valuable adjuvant when properly used. The induction of anesthesia with ether or with the ethyl chloride-ether sequence, or with nitrous oxide or ethylene and oxygen is materially shortened and rendered less distressing to the patient if a small amount of carbon dioxide is added to the anesthetic agents. It is not advisable to hasten the induction of anesthesia with chloroform. During the maintenance of ether or chloroform anesthesia, the addition of carbon dioxide is a remarkably rapid and efficient restorative measure if depression of the respiration or weakening of the pulse occurs. The anesthesia may be deepened by add-

ing a little carbon dioxide and increasing the amount of ether or chloroform, or lightened by adding a little carbon dioxide and decreasing the ether or chloroform

At the termination of ether anesthesia the addition of a 5 to 10 per cent mixture of carbon dioxide to air or oxygen aids the patient to excrete the ether more rapidly. However, care is necessary, for if the patient becomes unduly stimulated and the carbon dioxide is withdrawn, too much carbon dioxide will be eliminated and there will be a compensatory stage of respiratory depression. The carbon dioxide should be withdrawn gradually so as to leave the patient in a respiratory state as nearly normal as possible. Carbon dioxide may be used with advantage also after chloroform or gas anesthesia.

Renton also comments on the use of carbon dioxide and oxygen during the postoperative period to *prevent pulmonary atelectasis*. He states that thorough lung ventilation at intervals prevents atelectasis and consequently decreases the danger of infection. The periods of treatment with carbon dioxide and oxygen should include an inhalation for from 5 to 10 minutes at two-hour intervals in the first 24 hours and thereafter as often as deemed advisable.

An investigation was undertaken by A. C. Ernstene and M. C. Volk (J. Clin. Investigation 11:363 (Mar) 1932) to establish the range of carbon dioxide elimination and oxygen absorption through the skin in normal individuals of various ages under controlled conditions of temperature and relative humidity. Repeated measurements were made of the rate of carbon dioxide elimination and oxygen absorption through the skin in 38 normal subjects.

The rate of carbon dioxide elimination per hour per square meter of skin surface at 27° C varied in different individuals from 58 cc to 169 cc with an average value of 120 cc. The rate of oxygen absorption per hour per square meter of skin surface at 27° C varied in different individuals from 40 cc to 146 cc, with an average value of 88 cc. With each degree rise in the temperature of the air in contact with the skin, an average increase of 8 cc per hour per square meter of skin surface was observed in both carbon dioxide elimination and oxygen absorption.

The accelerated rate of gas exchange through the skin at higher temperatures probably is due principally to an increased rate of cutaneous metabolism. No relationship was observed between the rate of cutaneous respiration and the sex of the subjects or the season of the year. The rate of carbon dioxide elimination and oxygen absorption through the skin tended to be lower in subjects above the age of 40 years than in those below that age. The diminished rate of cutaneous respiration in subjects above the age of 40 years is probably, in the author's opinion, due to a decreased metabolic rate of the skin.

CARBON MONOXIDE.—POISONING—In studying the metabolic changes during chronic carbon monoxide inhalation, H. Reploh (Arch. f. Hyg. 107:283 (Feb. and Mar.) 1932) made observations on rabbits that were exposed daily from 6 to 12 months to small quantities of carbon monoxide. In comparison with normal animals, the exposed animals showed a considerably increased oxygen consumption, a slightly increased carbon dioxide elimination and a decreased respiratory quotient. Be-

cause the author's observations were similar to those made by Peisachowitsch, who investigated the changes in the incretory glands during carbon monoxide poisoning, he concludes that the metabolic changes are the result of changes in the incretory glands. Peisachowitsch noted changes particularly in the chromaffin tissues, in the suprarenal medulla, and in the thyroid. The clinical value of these studies is seen in the possibility to confirm the diagnosis of disorders caused by chronic carbon monoxide inhalation by means of metabolic tests, and the writer believes that such conditions may perhaps be treated by influencing the incretory glands.

T L Ramsey and H J Eilmann (J Lab and Clin Med 17 415 (Feb) 1932), in a comprehensive résumé of acute and chronic carbon monoxide poisoning, cite their observations in a series of experimental studies relative to the rapidity of elimination of carbon monoxide from the body and the histopathology of various tissues in animals dying directly during exposure and those killed and autopsied at varying periods later. A series of guinea-pigs was used and the animals were exposed to atmosphere fully saturated, 50 per cent, and 25 per cent saturation. The pigs that died all showed at least 70 per cent saturation of carbon monoxide in the blood. In atmospheres not fully saturated, where the animal was allowed to breathe the carbon monoxide somewhat longer, the blood concentration was high when the animal was removed and lived. In 1 animal removed from an atmosphere fully saturated with carbon monoxide, after an exposure of only $1\frac{1}{2}$ minutes, the gas was found to be present in the blood 31 days later.

Experiments were also performed upon dead animals to determine the

ability of the hemoglobin to absorb carbon monoxide after death. In 4 guinea-pigs killed by etherization, laked blood saturated with carbon monoxide from illuminating gas, was injected into the muscles, also beneath the skin and into the peritoneal and thoracic cavities. Twenty-four hours later the animals were autopsied and all showed similar appearances to those that had died from inhalation of this gas. This same experiment was performed on 2 pigs killed by etherization and then injected with embalming fluid. Twenty-four hours later laked blood with carbon monoxide was injected and the results were practically the same. Two pigs killed by etherization and embalmed 24 hours were placed in an atmosphere of illuminating gas. These pigs had been previously autopsied and the thoracic and abdominal cavities were open. After 8 hours the tissues and all the blood showed marked evidence of saturation with carbon monoxide.

Two other pigs, etherized and embalmed for 24 hours and not autopsied, but with the skin intact, were placed in an atmosphere of illuminating gas, the contents of the jar being changed by allowing the gas to enter once an hour for 8 hours. The pigs were then kept in the sealed jar overnight. Upon examination of these animals they presented the typical appearance of all the other animals that had died by inhalation of the gas.

CARDIOVASCULAR SYSTEM.—HEART DISEASE IN CHILDREN.—FUNCTIONAL MURMURS.—*Etiology*—A large

number of children have soft systolic murmurs over the precordium which often become inaudible with changes of position or after muscular exertion by

the patient The explanation of such heart murmurs in the absence of any demonstrable cardiac lesions has been very difficult A lack of muscle tone of the heart was considered to be the most plausible basis by J Epstein (Arch Pediat 48 635 (Oct) 1931) In 20 children with such murmurs who had no evidence of organic heart disease, no other illness, no demonstrable physical defect nor history of disease which might predispose to cardiac complications, there was lack of general physical stamina and the heart sounds were rather weak The blood-pressure of these patients was low and in several instances the electrocardiograms showed low voltage in all leads The response to exercise tests was rather sluggish From these findings, it was thought that the systolic murmur was due to a relaxation of the tone of the heart muscle and that the obvious treatment of the patient should be directed towards the improvement of his general health and muscular tone

Prognosis.—The subsequent course of a group of patients with apical systolic murmurs has been followed for a number of years in order to determine the significance and prognosis of such a finding M H Fineberg and L G Steuer (Am Heart J 7 553 (June) 1932) were able to observe a group of 100 children and young adults 2 to 21 years of age for an average period of 6 years Each had a rather loud systolic apical murmur with no other abnormal heart sounds Two of this series died during the period of observation, one of a bacterial endocarditis, the other of a pneumococcic meningitis Definite evidence of mitral stenosis was found in 17 per cent of the remaining group, and this was diagnosed after an interval of about $4\frac{1}{2}$ years as an average Aortic

insufficiency developed in 9 per cent and combined lesions in 4 per cent of the total number In all, 30 per cent of the group developed advanced cardiac lesions, 60 per cent continued to have their systolic murmurs without any change since the first examination, and 8 per cent had no murmurs Among the patients who had a history of attacks of rheumatism or chorea, cardiac lesions developed in 50 per cent, of those patients with evidence of cardiac enlargement on the first examination, 37 per cent developed severe cardiac lesions

Differential Diagnosis — As a means of differentiating functional from organic murmurs, exercise of the patient will often cause the disappearance of the former and accentuation of the latter type of murmur, or it may produce a murmur where none was heard before Since the type and amount of exercise is not uniform in many instances and since smaller children frequently do not cooperate well, another method of cardiac stimulation has been devised M M Maliner (Arch Pediat 49 305 (May) 1932) employed *subcutaneous injections* of a 1 1000 solution of *adrenalin* in doses of 3 to 15 minims (0.18 to 0.9 cc) in 62 children ranging in age from $3\frac{1}{2}$ to 15 years Records of the heart sounds and blood-pressure were made at intervals of 2 to 5 minutes thereafter until the effect of the drug had worn off

In 92 per cent of the group there were no uncomfortable reactions In the others, there were symptoms of rapid pulse, labored respiration, pallor or flushing of the skin, and tremor The effect on the cardiac sounds was striking in many instances, causing many supposedly organic murmurs to disappear and bringing out murmurs which had not been heard before, even after

the patient had had considerable exercise. In general, the adrenalin tended to intensify both the heart sounds and the organic murmurs and it localized the latter in more definite areas. Non-pathologic murmurs tended to disappear or to be localized in less important regions. Patients with myocardial weakness developed more soft and distant heart sounds shortly after the injection of the drug.

CONGENITAL LESIONS — *Cyanosis* in congenital heart disease usually results from incomplete aeration of the blood or from a shunting of venous blood into the arterial circulation. An effort has been made by C B Leech (Am J Dis Child 43 1086 (May-pt 1) 1932) to define the symptoms of the latter condition more distinctly. He collected the reports of 62 cases of congenital heart disease which were proven at autopsy to permit a mixture of venous and arterial blood, either within the heart or in the great vessels. About half of this murmur (43 per cent) had no symptoms during life which suggested congenital heart disease. There was no cyanosis in 50 per cent of the total number, and since cyanosis occurs in other types of congenital heart disease, that symptom alone was of little value in the differential diagnosis.

A syndrome which did occur in a small group of those patients who had a definite shunting of venous and arterial blood, was the appearance of *cyanosis* together with *disturbances in the respiratory rate, convulsive seizures* or *drowsiness*. This combination of symptoms, always associated with the development or with the deepening of coma, occurred only in the patients whose congenital cardiac abnormalities permitted a shunting of the venous blood.

In the *diagnosis* of congenital heart lesions the relative value of clinical signs and symptoms, roentgenograms and electrocardiograms was compared by C B Perry (Arch Dis Child 6 265 (Oct) 1931). A group of 119 school children with congenital defects of the heart was separated into categories suggested by their clinical symptoms. The majority were thought to have a patent interventricular septum, the tetralogy of Fallot, pulmonary stenosis, patent ductus arteriosus or sub-aortic stenosis. The consideration of these various groups of symptoms seemed to give a better indication of the nature of the heart lesion than did the physical signs. The x-rays were of little value except to indicate the size of the heart, and electrocardiograms showed no definite characteristics for any one of the above lesions and, therefore, this procedure was also of little aid in diagnosis.

Dextrocardia is one of the more rare congenital cardiac defects and there is some confusion in regard to the terminology. The term *dextrocardia* should be reserved for those cardiac conditions which are congenital in nature, in which the heart, by its own development, and independent of disease or anomaly of surrounding tissues, is situated in the right side of the thorax, with the apex pointing to the right. This was the definition given by S S Lichtman (Arch Int Med 48. 683 (Oct), 866 (Nov-pt 1) 1931). His extensive review of the subject included 161 case reports of true *dextrocardia* collected from the literature and 2 patients observed by himself. X-ray and electrocardiographic examinations were included whenever possible, but the subject is too lengthy to be discussed here.

In regard to the *diagnosis* of this heart lesion, the author emphasized the importance of eliminating any possibility either from the history or from the physical findings, of an acquired chest or pulmonary lesion, which might change the position of the heart. The x-ray and fluoroscopic examinations were the most valuable aids in the differentiation. Isolated dextrocardia should be differentiated from complete *situs inversus*. Other congenital lesions of the heart are rarely associated with this latter condition, while clubbing of the fingers and cyanosis occurred frequently in isolated dextrocardia and suggested some associated defect. In cases of *situs inversus*, the other organs of the body were transposed to the side opposite from normal. Transposition of the liver could be detected readily by palpation, the transposition of the stomach by x-rays, the transposition of the cerebral hemispheres was indicated by left handedness, the transposition of abdominal organs, by a lower position of the right testicle.

By more detailed examination a transposition of the lungs and aorta may be demonstrated, but these organs were less frequently involved in *situs inversus*. Evidence of inversion of the chambers of the heart was found to depend mostly upon electrocardiographic examination and some additional aid was obtained by x-rays. The majority of patients with dextrocardia died within the first year of life. After the age of 10 years the expectation of life might be judged to be 35 years, after 20 years of age the expectation of life was 44 years. A frequent *cause of death* of these patients was tuberculosis and bacterial endocarditis. The association of any other congenital heart lesion of course would make the prognosis un-

favorable in proportion to the severity of that additional lesion.

There is an ever increasing number of congenital cardiac abnormalities reported. The interesting condition of *truncus solitarius aorticus* has been observed in 2 instances by M. A. Kugel (Am Heart J 7 262 (Dec) 1931). One infant of 6 months had considerable dyspnea, cyanosis, clubbing of the fingers and toes, and a rough systolic murmur was audible over the left second interspace of the ribs. At autopsy it was found that the pulmonary aorta was absent from the base of the right ventricle. The interauricular septum was open and the ductus arteriosus was patent, so that the blood circulated from the right auricle to the left auricle to the left ventricle, and the small amount which became aerated in the lungs was that which was shunted into the ductus arteriosus. The other patient had a similar lesion except that the interventricular septum was patent instead of the interauricular septum. There were no murmurs heard in this patient. Somewhat the reverse of this condition was noted by S. Bellet and B. A. Gourley (Am J M Sc. 183 458 (Apr) 1932) in a case of congenital anomaly of the heart in an infant, 12 hours of age, in which the aorta was atresic, the ductus arteriosus patent, the interauricular and interventricular foramina closed. Blood apparently gained access to the systemic circulation by way of the patent ductus arteriosus. The myocardium of the left ventricle was fibrotic and there were vestiges of what were considered to be embryonic sinusoids in the left auricular appendage and left ventricle.

An unusual congenital lesion, *cor biloculare*, with a truncus arteriosus was observed by A. Tow (Am. J Dis Child 42 1413 (Dec) 1931). The child was

5 months of age and had been cyanotic since birth. The heart sounds were weak but no murmurs were heard. At autopsy, the heart was found to be composed of a single auricle and a single ventricle with a bicuspid valve between them. A single aorta arose from the ventricle and from this branched the 2 pulmonary arteries. A single coronary vessel arose from the left pulmonary artery. The case was unusual in that vegetations occurred on the leaflets of the single bicuspid valve.

Another instance of *persistent truncus arteriosus* was reported by M. K. Miller and M. W. Lyon, Jr. (Am Heart J 7:106 (Oct) 1931). This occurred in an infant who lived 11 days with symptoms of cyanosis, a weak cry, inability to nurse well, difficulty in swallowing, and vomiting. Considerable saliva drooled from the mouth and accumulated in the throat. The x-rays showed a marked hypertrophy of the heart, especially of the right auricle and ventricle, and the lateral view demonstrated a large right ventricle, filling the retrosternal space. At autopsy the diagnosis of hypertrophy of the heart was confirmed and, in addition, there was found a persistent truncus arteriosus which arose from the right ventricle. In the absence of the pulmonary artery, the lungs apparently received a restricted blood supply from enlarged bronchial arteries. A small opening connected the right and left ventricle.

The case of a patient, who had been observed over a period of 6 years, with symptoms and signs of coarctation of the aorta was reported by J. B. Wolffe (Arch Pediat 49:100 (Feb) 1932). There were the classical symptoms of diminished blood-pressure of the lower extremities, absence of a femoral pulse and evidence of collateral circulation in

the neck vessels. In addition, x-rays showed an absence of the aortic knob, a lack of continuity of the aortic arch, and an erosion of the inner surface of the third to tenth ribs. The development of a rheumatic infection apparently led to the formation of an aneurism of the innominate artery. The patient is living and healthy at the present time.

Calcification of areas of the myocardium has been observed recently in a premature infant, of a 26 weeks' gestation, who lived but a few minutes. M. Diamond (Arch Path 14:137 (Aug) 1932) explained the presence of such a lesion at this age as probably due to a local toxic degeneration, since there was no evidence of an inflammatory lesion, vascular disturbance of the aorta or coronary vessels, or deficiency in calcium metabolism.

ARRHYTHMIAS. — *Paroxysmal tachycardia* in children has apparently received much more attention in the literature since the advent of the electrocardiograph. Four such cases were reported recently by C. Shookhoff, A. M. Litvak and I. Matusoff (Am J Dis Child 43:93 (Jan) 1932). The ages of these children ranged from 3 to 10 years. Whooping-cough preceded the tachycardia in 2 instances, bronchitis in a third, and definite heart disease in the last. Three children of this group were diagnosed as having auricular flutter, the fourth child as paroxysmal auricular tachycardia. It was thought that most of the arrhythmias of childhood were due to myocardial disease rather than to disturbances of conduction.

An instance of paroxysmal tachycardia which was thought to be congenital in nature was reported by L. Doxiades (Ztschr f Kinderh 52:141, 1931). An infant, only a week old, had

an attack which lasted for 9 days, with recurrences during the next few weeks. The etiology in this instance could not be ascribed to any demonstrable congenital lesion and it was thought that an unstable nervous system must be held accountable.

A cardiac arrhythmia which is quite uncommon in children is *auricular fibrillation*. It was noted in 19 patients of a total of 1345 children with heart disease (14 per cent) by H. W. Schmitz (Am J Dis Child 44:310 (Aug) 1932). In all but 2 of this group there had been a previous rheumatic infection and all of the 19 patients had mitral stenosis and insufficiency. In 6 of the group there was thought to be an aortic insufficiency in addition. The ages of these children at the time the fibrillation was first noticed varied between 8 and 16 years, and this arrhythmia had developed 1 to 10 years after the onset of the cardiac disease. Seven children died within 17 days to 44 months after diagnosis of the fibrillation. The *prognosis* of this condition was considered to be dependent upon the extent and activity of the underlying lesion and, therefore, the usual *treatment* of rheumatic carditis was strongly indicated. **Bed rest** was advised when there was any sign of activity of the infection, such as an elevation of temperature, an increase in the pulse rate or a leukocytosis. Although it is known that digitalis may produce auricular fibrillation in such patients, such therapy seemed to be strongly indicated in cases of congestive failure and rapid ventricular rates.

Heart block of the Stokes-Adams type is a very unusual occurrence in children. Such a case was reported by L. A. Alderson (Am J Dis Child 43:514 (Feb) 1932) in a boy 11 years of age who had had numerous fainting

spells of short duration and slight dyspnea but no cyanosis. There was no history of previous rheumatic fever, the electrocardiogram showed an auricular rate of 70, a ventricular rate of 35 per minute, an auriculoventricular dissociation and abnormalities of the QRS complexes.

ENDOCARDITIS — A complete review of the subject of endocarditis in childhood was published recently by Bindo de Vecchi (Arch Path 12:49 (July) 1931). The incidence of the disease among 4952 autopsies of the Institute of Pathological Anatomy of Florence was 179 or 3.6 per cent. Of these cases, 93 were acute vegetative or ulcerative types, and 83 were subacute infections. The condition was rare among younger children, occurring in only 18 or 1.69 per cent of 1062 autopsies of patients under 10 years of age. Of these 18 cases, only 2 occurred in infants under 1 year of age, while 6 occurred in the children 1 to 5 years of age, and 10 in children 6 to 10 years old. A series of 42 patients with endocarditis who came to autopsy were divided into various groups, according to the nature of the lesions. It was the author's opinion that many endocardial lesions, especially of the valves, could not be diagnosed from macroscopic examination alone. In infants and children, the valves are especially thin, and their early or mild involvement could only be made out with the help of the microscope. In several instances, there was evidence of endocarditis following diphtheria, pneumonia and tuberculosis, and the changes in the valves were considered to be toxic in origin. Such lesions were less frequently followed by thrombosis in the local vessels and, therefore, tended to heal more completely, leaving less scar tissue than

would usually result from the grosser bacterial infections. The early lesions and the toxin reactions of the endocardium of the valves, which failed to attract attention macroscopically but were noted in microscopic sections, were characterized by epithelial desquamation, lymphocytic infiltration of the valvular tissue, areas of superficial necrosis or hyaline degeneration. It was the author's opinion that these minute lesions require more consideration in subsequent studies of endocarditis.

An unusual type of endocarditis which involved the lining of the left ventricular wall, rather than the valves, was described by A. E. Boysen (Am J Dis Child 43:143 (Jan) 1932). A colored infant developed signs of congestive heart failure at the age of 9 months. The heart was enlarged but no murmurs could be heard. At autopsy an infected thrombus in the endocardium of the left ventricle was found and bacteriologic cultures contained a pure strain of *Streptococcus viridans*.

RHEUMATIC HEART DISEASE.—Incidence.—It has been accepted generally from previous statistics that rheumatic fever occurs more frequently among persons in the lower social strata, especially among those who live in poor hygienic surroundings. A comparison of the incidence of the disease among 7914 Yale undergraduate students with that of the average groups elsewhere confirmed this belief. Such a study was made by J. R. Paul and P. A. Leddy (Am J Med Sc 184:597 (Nov) 1932), the rate of incidence being 8.2 per 1000 students and 15 per 1000 men in other occupations. The students who had attended expensive boarding schools had less rheumatic fever (5.8 per 100) than those who had been in high schools (12.5 per 1000).

Evidence of rheumatic heart disease was found at autopsy and from the clinical records in 9.1 per cent of 5215 patients who died at the Boston City Hospital between the years of 1905 and 1929 inclusive. According to D. Davis and S. Weiss (Am Heart J 7:146 (Dec) 1931), this rate was higher than average figures reported elsewhere, probably because the group included large numbers of the poorer classes of people. The disease occurred more frequently in males (62 per cent) than in females (38 per cent) and the incidence in negroes was small. Although 8 per cent of the total number of autopsies were performed on negroes, only 3.8 per cent suffered from rheumatic heart disease. In the total group of patients the cardiac involvement accounted for the death of 34.5 per cent, contributed to death in 8.6 per cent, and apparently had no causal relationship in 43.2 per cent of instances. Endocarditis which developed on previously damaged valves occurred as a complication in 13 per cent of this group. The endocarditis was of the subacute bacterial type in 8.6 per cent and malignant in the remaining 4.4 per cent of these patients.

Pathology.—Lesions of an inflammatory character have been described in the blood-vessels of patients with rheumatic fever. In addition to these, certain atherosclerotic changes in the aorta, pulmonary and coronary arteries have been reported by P. Zeek (Am J M Sc 184:356 (Sept) 1932). These lesions are types of simple arteriosclerosis, beginning with lipid infiltration of the intima and later followed by fibrous tissue formation and calcification. In 28 patients under 31 years of age, with definite evidence of rheumatic heart disease, atheromata were found in various stages of development in 25 instances.

(89 per cent.) In one patient of 7 years who had had demonstrable rheumatic fever for only 3 months, early atheromatous changes were evident in the aorta. There did not appear to be any relationship between the severity of rheumatic carditis and the extent or the stage of development of the atheromata. No other blood-vessels appeared to be involved, although lipoid changes were observed in the splenic capsule, in the pleura, beneath the uterine peritoneum and in the tubular epithelium of the kidney in rare instances.

Early lesions of rheumatic *endocarditis* in persons who experienced sudden death from some other cause were described by T Leary (Arch Path 13 1 (Jan) 1932). The typical reaction of the tissue seemed to be a palisade arrangement of the cells on the valve surfaces. The earliest lesions observed were areas of necrosis of the end plates of the cells, and, later, the process extended to the entire cells, finally terminating in hyaline masses of necrotic tissue. Fibrous tissue formed under the necrotic area. The verrucæ apparently began to develop from fibroblastic cells projecting up beneath the necrotic hyaline mass and situated at right angles to the surface, giving the palisade appearance. In places where damage to the palisade layer occurs, new verrucæ appear. Healing is characterized by a fusion of the verrucæ and vascularization of these old scars. In the completed process, endothelium grows over the lesion and only a pearly scar remains. Early lesions seemed to grow on the surface of otherwise normal valves, and bacteria, when present, were arranged along the surface of the palisade cells. This was taken as evidence that the harmful agent approached from the surface rather than by way of the blood-

vessels within the valve. Reinfections apparently occurred frequently, since new verrucæ were sometimes seen on old healed scars. In some of the lesions there was the entire absence of bacterial infection, in still others thrombosis was a prominent feature.

Etiology.—Numerous microorganisms have been suggested in past years as the etiology of rheumatic fever. The bulk of evidence is in favor of certain strains of the *streptococcus*. There is a great deal of conflict of opinion on the subject and no definite conclusions can yet be drawn. Within the last year infectious cardiac lesions have been produced experimentally by N W Jones and S J Newsom (Arch Path 13 392 (Mar) 1932). A culture of a green-producing, nonhemolytic streptococcus was implanted into the teeth of 12 dogs and the subsequent development of abscesses was verified by x-rays and post-mortem examinations. These animals, together with an equal number of untreated dogs, were subjected to vigorous exercise each day for the purpose of determining the influence of this factor on the production of myocardial hypertrophy. Hypertrophy was found much more prevalent among the inoculated animals than in the control group, as determined by direct measurements of the diameters of the cardiac muscle fibers. The hypertrophy was probably the result of the focal infection which had also produced vegetations on the mitral and aortic valves and patchy changes in the parenchyma of the heart with round cell infiltration.

Additional evidence that a *streptococcus* is an etiologic factor in rheumatic fever was gathered from a series of serum agglutination experiments by E E Nicholls and W J Stainsby (J Clin Investigation 10.337 (June)

1931) They employed a microorganism which was a strain of nonhemolytic streptococcus, isolated from the blood stream of a patient with rheumatic fever, and tested its agglutination with the blood sera or joint fluid of patients with various infections. The sera of 3 patients with chronic arthritis following a rheumatic fever attack agglutinated the microorganism in fairly high dilutions. Six patients with subacute bacterial endocarditis caused agglutination in very high titers. In 4 patients with rheumatic fever the blood sera caused agglutination during early stages of the disease, but this power diminished rapidly as convalescence progressed.

On the other hand, no bacteria could be found in the blood stream of rheumatic fever patients by L. E. Cooley (J Infect Dis 50 330 (Apr) 1932). He cultured 15 c.c. samples of blood from 25 children, 6 to 14 years of age, who were suffering from early manifestations of rheumatic fever. All had fever of at least 100.5° F (38° C) when the blood samples were taken. These cultures, incubated for 1 month, remained sterile except for an occasional contamination.

There has been considerable evidence produced from time to time of the *contagious* nature of acute rheumatic fever. An opportunity to study this subject was afforded to W. R. F. Collis (Am J Dis Child 44 485 (Sept) 1932) when respiratory infections broke out in wards filled with convalescent rheumatic fever patients. One such group, which consisted of 25 children, had cultures of their throat secretions taken at regular intervals. When a nasopharyngeal infection broke out in the ward 13 children of the group were found to have been infected. In 8 of

these patients there were rheumatic fever relapses and evidence of increased activity of their cardiac lesions. These relapses occurred 7 to 21 days after the onset of the respiratory infection. The microorganism which was obtained most frequently was a *hemolytic streptococcus* which was found in purest cultures at the height of the infection. Subsequent epidemics of respiratory infections which spread among this group but were not due to the hemolytic streptococci, did not result in rheumatic exacerbations. The presence or absence of tonsils did not seem to play an important etiologic rôle, although pure cultures of the microorganism were isolated from the tonsils in several instances. Skin tests made with culture filtrates (exotoxin) of this microorganism were not positive in any greater numbers of the patients with rheumatic carditis than in normal groups. On the other hand, solutions of the ground streptococci (endotoxin) gave positive skin reactions in 100 per cent of rheumatic patients and in only 20 per cent of control groups. It was the author's belief that this strain of streptococcus had some direct causal relationship to rheumatic fever.

Skin tests of rheumatic fever patients have also been employed recently by W. R. F. Collis, W. Sheldon and N. G. Hill (Quart J Med 1 511 (Oct) 1932). The material was prepared by the grinding of hemolytic streptococci which were obtained from the tonsillar exudates of patients who had had acute tonsillitis and subsequent rheumatic fever during a recent epidemic. These bacterial products containing nucleoprotein or "endotoxin" were injected intradermally, in various dilutions, into 303 rheumatic children and 256 normal children. The percentage of positive

reactions was about twice as great in the rheumatic group (58 per cent) as the nonrheumatic group (28 per cent). Patients with chorea reacted in slightly higher percentages than did those with rheumatic fever. About 80 per cent of the 303 children with rheumatic fever gave positive reactions during the first 6 months after an acute attack of the disease, while only 40 per cent were positive a year after the last acute attack. The skin reactions of patients with very severe heart disease with congestive failure were often modified or negative, even though a strong reaction had been obtained in that patient previously, and again when recovery had taken place. There was no relationship between the percentage of positive skin reactions obtained with this material and with Dick test toxin. Considering the differences in method of preparation of these two materials, there was no reason to expect a parallel action. Extracts made from cultures of various other microorganisms failed to give percentages of positive reactions which were higher in rheumatic than in non-rheumatic groups, with one exception. An extract of a *Streptococcus viridans* caused a fairly high percentage of positive reactions in rheumatic fever patients as compared with the other children.

Diagnosis.—In regard to contagious factors of rheumatic fever, W H Bradley (*Ibid* 1 79 (Jan) 1932) has observed 2 epidemics of the disease associated with a widespread prevalence of tonsillitis. In one epidemic, cultures of *hemolytic streptococcus* were obtained from the tonsils of 3 children and from pharyngeal and tonsillar swabs of 8 patients suffering from joint pains and signs of heart involvement. In the second epidemic, numerous cases of

tonsillitis and rheumatic fever appeared at the same time. Cultures taken from the nose and throat secretions of 105 patients showed hemolytic streptococci in 77 instances, but in 66 of these cultures the microorganism was of a different strain than that of the previous epidemic. It was concluded by the author that the disease was spread by droplet infection and that some relationship between the tonsillitis and rheumatic fever existed, possibly in the nature of a hypersensitivity of the patient to these strains of streptococci.

In an attempt to find some better criterion of the state of activity of rheumatic heart disease, B Schlesinger (*Ibid* 1 67 (Jan) 1932) studied the *sleeping pulse rate* of such patients. The pulse rate of normal children who were awake was found to be about 10 beats per minute faster than when they were asleep. In 35 children with active rheumatic carditis, both the sleeping and the alert pulse rates were faster than normal but the drop occurring during sleep was only about half that of normal children. A group of 14 patients was observed during the active stage of their heart disease, and the difference in the pulse rates when they were awake and asleep ranged between 0 and 8 beats per minute. The same children during the healing stage had pulse rates 4 to 20 beats per minute slower when they were asleep than when awake. The failure of the heart to slow down during sleep was considered as evidence of active heart disease.

The *electrocardiograph* has proved helpful in the diagnosis and prognosis of rheumatic heart lesions. Numerous observations of this nature have been made in the last decade. A recent electrocardiographic study of a group of 87 children, 5 to 15 years of age, with

rheumatic fever in various stages of heart failure was made by M M Weiss (Am J Dis Child 42 1339 (Dec) 1931)

In children who had chronic cardiac disease, heart failure and a regular rhythm, the diagnosis was confirmed by electrocardiograms, but no additional information was added, they proved valuable, however, in the determination of the stage of the lesion and of the prognosis. An increase in the height and notching of the P-wave was characteristic in the tracings of patients with mitral stenosis and insufficiency. Auriculoventricular conduction disturbances were noted in 30 per cent of the patients and right axis deviation occurred in 60 per cent of those with mitral stenosis. In 7 instances the S-T waves were above the isoelectric line and in 2 cases the T wave was inverted in Leads II and III.

Treatment—There has been considerable variation of opinion as to the value of *salicylate* therapy in rheumatic carditis. It is the opinion of many that salicylates merely relieve the symptoms of pain and fever, while others contend that the drug has curative and even prophylactic properties. In a study of 33 patients with rheumatic fever who were given salicylates, and 30 others with similar symptoms but with no such therapy, A M Master and A Romanoff (J A M A 98 1978 (June 4) 1932) concluded that there was no essential difference in the two groups in regard to their cardiac involvement, in the length of stay in the hospital or in the incidence of other complications. The dosage of salicylates in the treated groups was 120 to 180 grains (8 to 12 Gm) daily as a minimum to the adult patients, which was considered to be adequate to produce therapeutic results.

Electrocardiograms of these patients indicated myocardial involvement in every instance.

There has been considerable variation in the results obtained with *digitalis* in reducing the edema of children with rheumatic carditis. The results of S P Schwartz and J Levy (Am J Dis Child 42 1349 (Dec) 1931) indicated that this therapy was of little or no value. A group of 67 children with rheumatic fever, and chronic valvular disease, a normal sinus rhythm and congestive failure, were given digitalis to the point of nausea or vomiting, or, if there were no toxic symptoms, the drug was continued in adequate dosage for long periods of time. In only 1 instance was there a reduction of edema, as judged by a loss of 16 pounds of weight. In this patient, however, previous digitalization had had no effect, while other children with edema improved without digitalis therapy and only with bed rest. It was the author's opinion that the heart disease in these instances was not of the type which responded to digitalis treatment. If digitalis is employed, it was thought advisable to observe the patient closely for therapeutic response and if this did not occur within a short time, the drug should be withdrawn.

In regard to the value of *tonsillec-tomy* in the treatment or prevention of rheumatic fever, recent investigations have given contradictory results. Recently, W H Robey (M Clin North America 15 875 (Jan) 1932) reported the histories of 9 patients who had tonsils removed as a method of treatment of acute rheumatic fever. In 4 instances the joint symptoms definitely improved within a short time after the operation. In 1 instance an abscess containing a pure culture of *Streptococcus viridans* was found. Patients who had had in-

complete operations which left remnants of tonsillar tissue in place did not show any improvement of their rheumatic condition. It was the author's conclusion that tonsillectomy could be performed in the presence of fever and joint pains without danger, but it should not be done when the tonsils are acutely inflamed.

On the assumption that a streptococcus plays an active rôle in the etiology of rheumatic fever and that *hypersensitivity* to this microorganism is an important factor producing the symptoms, M. G. Wilson and H. F. Swift (Am J Dis Child 42:42 (July) 1931) employed intravenous injections of streptococcus vaccine until a *hyposensitivity* was developed in the patient. A group of 172 children, most of them under 10 years of age, were selected for study, and about half of this number were given heat-killed suspensions of hemolytic streptococci isolated from the tonsillar exudates of a patient who had been suffering for some time with acute joint pains and severe carditis. The first injection contained about 250,000 microorganisms, and subsequent weekly injections consisted of amounts double the preceding one until a dosage of 10,000,000 microorganisms was reached. Observed over a period of 2 years, the treated group had fewer recurrences or manifestations of activity of the disease than the untreated group. There was a complete absence of recurrent attacks in 45 per cent of the treated group, as compared with an absence in only 18 per cent of the control group.

Questions raised by the authors were, (1) whether the treatment acted as a vaccination which stimulated antibody production, due to the action of the vaccine as a specific or a nonspecific an-

tigen, (2) whether there was any true relationship between the treatment and the results, but only a coincidental disappearance of symptoms, or (3) whether the reaction was due to the production of hyposensitivity to the infection. Although proof was lacking, the bulk of evidence seemed to indicate that the most likely mechanism was that which was mentioned last.

CARDIAC COMPLICATIONS OF SCARLET FEVER AND DIPHTHERIA—Variation which occurred in the electrocardiograms of 259 normal children between the ages of 6 and 14 years were noted by C. Shookhoff and L. M. Taran (Am J Dis Child 42:342 (Aug) 1931). The tests were made at the same time each day (3 P. M.) and a small group of 20 were followed daily for 2 weeks, to determine the extent of variations which might occur. The average rate of the heart beat was found to be highest in the children who were 10 years old, and to be less rapid after that age. The average rate was higher in the girls than in the boys of this group. Sinus arrhythmia occurred more frequently among the oldest children, in spite of the general decrease in cardiac rate. Only 1 child of the entire series had extra systoles. Abnormalities of the P wave in Lead III occurred in 17.5 per cent of the group but the P-R and Q-R-S intervals were well within normal limits. In 24.8 per cent of the group, T waves in Lead III were inverted and in the daily examination of 20 children, frequent variations in the direction of this wave occurred in 3 instances. In 34.7 per cent of the total group there was evidence of abnormalities of axial deviation which persisted for 2 to 3 years, without any explanation. Exercise seemed to have no effect on the trac-

ings except to increase the rate and decrease the frequency of sinus arrhythmia

Employing these results as a standard of comparison, Shookhoff and Taran (*Ibid* 42 554 (Sept) 1931) observed the electrocardiograms of 50 children with *scarlet fever* in order to determine the cardiac involvement in that disease. Except for a bradycardia which occurred in 25 per cent of the group of patients during the second and third week, and some minor changes in the R or R-T waves in 10 per cent of instances, the hearts of these children behaved in a manner similar to that of the control group. The authors made the interesting observation that in none of these children were there any characteristic findings of rheumatic fever carditis such as the prolongation of the P-R interval, evidence of myocarditis, or the persistence of any of the minor deviations from normal. In children with *diphtheria*, however, there were many changes in the electrocardiogram (See *Diphtheria*, Complications)

A similar study of cardiac complications in patients with *scarlet fever* and *diphtheria* was reported by E. H. Place (*New England J. Med.* 207 864 (Nov 17) 1932). Myocarditis alone was found to be rare in scarlet fever patients and the endocardial lesions, which occurred in only 0.1 per cent of the patients studied, were benign and usually resulted in complete recovery. In this respect, as well as in other manifestations, heart lesions of scarlet fever patients differed considerably from the carditis associated with rheumatic fever. The cardiac complications of *diphtheria* were found to be mainly disturbances of the conduction mechanism or a *myocarditis* and the electrocardiograms gave considerable diagnostic and prognostic

aid. Especially in cases of *heart block*, the electrocardiogram indicated the degree of severity long before the clinical diagnosis could be made. The methods of treatment of such patients were enforced rest, with the aid of sedatives or narcotics, and administration of glucose solution by rectum or intravenously.

CARDIAC ARRHYTHMIAS — AURICULAR FLUTTER.— In a series of 65 cases of auricular flutter studied by T. M. McMillan and S. Bellet (*Am. J. M. Sc.* 184 33 (July) 1932), a return of normal rhythm was secured in 66.1 per cent of all the cases, and in 74.4 per cent of these with established flutter. Twelve of the cases were classed as *paroxysmal*, and 43 as *established flutter*. Duration of 2 weeks or longer placed the patient in the latter class. In 2 instances the arrhythmia was apparently caused by toxic doses of digitalis, and in 5 it was the result of the quinidine treatment of auricular fibrillation. Usually it was the result of antecedent inflammatory or degenerative changes in the auricular muscle.

Rheumatic fever, *diphtheria*, hyperthyroidism, and coronary occlusion were at times acute cases. The *symptomatology* was found to be roughly in direct proportion to the ventricular rate. With rates of 150 and over, the symptoms, as a rule, were quite marked, while with rates under 100, the symptoms due to flutter *per se* were practically absent. Mental disturbances were present in 10 cases with high ventricular rates and with marked evidence of congestive heart failure. The weight of evidence indicated that embolism rarely, if ever, occurs during flutter. This accident occurred in 5 cases, which is in agreement with the findings of J. Parkinson and D. E. Bedford (*Quart*

J Med 21 21 (Oct) 1927) In 16,000 electrocardiograms of 6500 different patients, who either had or were suspected of having cardiac disease, auricular flutter was found in 1 of every 80, and auricular fibrillation in 1 of every 14. The youngest patient in their series was 12 years of age and the oldest 86, the average age being 54 years. In most of the cases the flutter was impure. Before treatment was instituted, 36 of the patients had 2:1 auriculoventricular heart block, 11 showed a combination of 2:1 and 3:1 block, and the remainder showed either higher grades of block or changing A-V ratios, resulting presumably from digitalis, which had been used in small amounts. In only 6 was the ventricular rate at the initial observation below 100, and of these, 4 had received digitalis.

One patient, a man of 65 years with evidences of arteriosclerotic heart disease, had complete A-V heart block (not due to digitalis), associated with auricular flutter (Auricular flutter with 1:1 ventricular response, usually manifesting itself for short periods during ordinary 2:1 flutter, occurs rarely, only 19 cases having been reported in the literature). The choice method of treatment of auricular flutter employed by these authors was the use of digitalis until fibrillation was established, digitalis was then discontinued and, unless a normal rhythm had returned spontaneously within a week, the administration of quinidine was begun. Quinidine was also used when digitalis caused certain toxic manifestations, which rendered its further use inadvisable.

AURICULAR FIBRILLATION.

—*Treatment.*—*Quinidine Therapy*—S A Weisman (Arch Int Med 49 728 (May) 1932) reports the restoration of normal rhythm in 17 (70.8 per

cent) of 24 cases of auricular fibrillation treated with quinidine by the ambulatory method. Of those patients successfully treated, 4 had *rheumatic heart disease*, 10 had *hypertension and coronary sclerosis*, 1 had *diabetes and hypertension*, 1 had *syphilitic aortitis*, and 1 had an apparently *normal heart*. In 14 of the 18 patients who were 50 or more years of age, the rhythm was restored to normal, while in 3 of the remaining 6 cases regular rhythm was restored. The individuals with hypertension seemed to respond more quickly than the rheumatic group. In all cases digitalis was given first, preferably for a few days, and in cases with cardiac decompensation digitalization was carried on until improvement in circulatory efficiency was secured. Quinidine sulphate was then given in small doses. The first day 0.1 Gm ($1\frac{1}{2}$ grains) was given, the second day 0.2 Gm (3 grains), and then 0.4 Gm (6 grains) daily for 5 days (0.1 Gm— $1\frac{1}{2}$ grains—every 2 hours).

On the seventh day the dose was increased to 1 Gm (15 grains) per day, after a few days, if necessary, it was increased to 20 grains (1.3 Gm), 5 grains (0.3 Gm) being given every 2 hours until 4 doses were administered, and then it was increased to 30 grains (2 Gm), 10 grains (0.65 Gm) every 2 hours. As much as 40 grains (2.6 Gm) per day was given in 10-grain (0.65 Gm) doses at 2-hour intervals. As soon as the rhythm of the heart became regular, the dose of quinidine was reduced, and a maintenance dose of 10 grains (0.65 Gm) per day, or 5 grains (0.3 Gm) daily or every other day was established. With the possible exception of 1 case, in no instance were the toxic symptoms of quinidine so severe that the drug had to be discontinued.

During the treatment 1 patient, aged 37 years, developed hemiplegia, and another patient, aged 49 years, died of coronary thrombosis. Weisman is of the opinion that the unpleasant effects of quinidine therapy, so often mentioned in the literature, have been overemphasized, and that the danger of embolism under quinidine therapy is not much greater than with any other form of treatment.

VENTRICULAR FIBRILLATION, TRANSIENT.—In a study of a patient with auriculoventricular dissociation, who suffered from 67 seizures of unconsciousness during a period of 7 months, S. P. Schwartz (Arch Int Med 49:282 (Feb) 1932) found that each syncopal seizure was associated with periods of ventricular fibrillation. The longest recorded attack with spontaneous recovery lasted 6 minutes and 2 seconds.

The patient was a woman, aged 66 years, with signs of severe congestive heart failure. The average basic ventricular rate oscillated between 28 and 36.5 beats per minute. The lowest regular ventricular rate recorded was 17.5 beats per minute at a time when the patient was up and about. The Q-R-S complexes were all of the supraventricular form, but were followed by an unusually large, wide and completely inverted T-wave. Infrequently, the Q-R-S complexes were variable from beat to beat in height as well as in duration, often assuming transitional changes from a dextrocardiogram to a levocardogram and *vice versa*. The auricular rate was 100 beats per minute.

The alterations in the electrocardiogram preceding a syncopal seizure consisted of a gradual acceleration through step-like progressions of both the basic auricular and ventricular rates, the

highest regular ventricular rate recorded being 65.2 beats per minute before the onset of ventricular fibrillation. Periods of reexcitation of from 4 to 11 beats at a time appeared during the premonitory period, heralding the approach of a seizure of unconsciousness. The onset of every recorded seizure of ventricular fibrillation was initiated by a ventricular extrasystole which was always of the same character and arose from the same focus in the focus in the ventricle. During the periods of ventricular fibrillation the ventricular rates varied from a minimum of 250 to a maximum of 1000 beats per minute.

Spontaneous revival of consciousness usually coincided with cessation of fibrillation. The mode of recovery was variable, but the restoration of the basic rhythm was preceded by an idioventricular rhythm, with a slightly irregular ventricular rate following, as a rule, a postundulatory pause. Even when a postundulatory was not to be seen, recovery took place through the intermediary rhythm, with impulses originating in a focus different from that of the basic ventricular rhythm.

Schwartz expresses the opinion that periods of *unconsciousness* in patients with auriculoventricular dissociation are associated with transient seizures of ventricular fibrillation, and that a clinical diagnosis of transient ventricular fibrillation may be suspected in such patients, if preceding a period of unconsciousness the heart rate is found to increase above that of the usual basic rate.

CORONARY ARTERY DISEASE—INCIDENCE—In a review of the 148 autopsy records of the Presbyterian Hospital, New York City, covering a 10-year period from 1920 to 1929, inclusive, R. L. Levy (Am Heart J 7:431 (Apr) 1932) found 107 per

cent (148 cases) to show lesions in the coronary vessels. The etiological types of pathological condition observed with their relative frequency, are shown in Table I.

TABLE I

ETIOLOGIC TYPES OF CORONARY DISEASE WITH ASSOCIATED PATHOLOGIC STATES,* THEIR RELATIVE FREQUENCY IN 148 AUTOPSIES AT THE PRESBYTERIAN HOSPITAL, NEW YORK (1920 TO 1929, INCLUSIVE)

1	Arteriosclerosis	
	(a) Atheroma	}
	(b) Calcification	
	(c) Stenosis	
	(d) Occlusion	
	(e) Thrombosis	22
	(f) Infarct of myocardium	56
	(g) Aneurism of heart	5
	(h) Rupture of heart	3
2	Syphilis.	
	(a) Stenosis or obliteration of orifice	12
	(b) Infarct of myocardium	3
3	Rheumatic fever	
	(a) Arteritis	2
4	Embolism	1
5	Periarteritis nodosa	
	(a) Arteritis	1

* Obviously, in a number of instances, more than one lesion was present.

Clearly, the arteriosclerotic group, with the concomitant morbid changes in the heart, is by far the most important numerically. Syphilis of the coronary arteries is seen almost exclusively in association with specific aortitis, and assumes clinical importance only when one or both coronary orifices become stenosed or obliterated. For the present, the coronary lesions of rheumatic fever are of interest chiefly to the pathologist. The infrequency of embolism of a coronary artery also deserves mention, having been found but 3 times in a series of 3093 autopsies performed in a period of 24 years.

In referring to the steady rise of heart disease during the past 20 years

to first place in the mortality statistics, Levy calls attention to the fact that the increasing number of deaths from heart disease occurs almost entirely in persons over 45 years of age, and that in the younger groups the rate is actually falling. The increasing number of cardiac deaths in older individuals can be explained by the fact that more people are living to the "heart age," *i.e.*, they survive to that period of life when degenerative processes affect the circulatory system to a sufficient degree to cause functional impairment, and, furthermore, the growing body of knowledge concerning cardiovascular conditions has resulted in more accurate diagnosis. Analysis of the same autopsy records afforded no support for the current impression that an increasing proportion of the population is dying of coronary artery disease. As shown in Table II, the percentage of cases of coronary artery disease was practically the same in 1929 as in 1920. However, during the same 10-year period the percentage of cases diagnosed as coronary artery disease in relation to the total number of admissions to the medical service rose from 1.1 in 1920 to 4.3 in 1929, a four-fold increase (see Table III).

This discrepancy between autopsy and clinical records can possibly be explained by the fact that during the last 2 decades clinicians have grown to be "heart-minded," and in the 10 years just passed they have become "coronary conscious." Consequently, many of the milder, nonfatal and atypical forms of coronary disease are being recognized with increasing frequency.

In Working Classes.—In a study of 615 individuals of the industrial class in New York City with symptoms of heart disease, E. P. Boas and S. Donner (J. A. M. A. 98:2186 (June 18) 1932)

TABLE II

PERCENTAGE OF CASES OF CORONARY ARTERY DISEASE* IN RELATION TO TOTAL NUMBER OF AUTOPSIES, 1920 TO 1929, INCLUSIVE (PRESBYTERIAN HOSPITAL, NEW YORK)

Year	Total Number of Autopsies	Number of Cases of Coronary Disease	Percentage of Cases of Coronary Disease
1920	124	16	12.9
1921	91	12	13.2
1922	147	13	8.8
1923	123	7	5.7
1924	127	13	10.2
1925	118	14	11.9
1926	144	20	13.9
1927	115	13	11.3
1928	151	11	7.3
1929	240	29	12.1
Total period	1380	148	10.7

* Anatomical diagnoses included are arteriosclerosis of coronary artery, thrombosis of coronary artery, embolism of coronary artery, syphilitic stenosis or obliteration of orifice of coronary artery, infarct of heart and aneurism of heart. Cases filed under more than one heading are counted only once.

TABLE III

PERCENTAGE OF CASES DIAGNOSED AS CORONARY ARTERY DISEASE* IN RELATION TO TOTAL NUMBER OF ADMISSIONS TO MEDICAL SERVICE, 1920 TO 1929, INCLUSIVE (PRESBYTERIAN HOSPITAL, NEW YORK)

Year	Total Number of Medical Admissions	Number of Cases of Coronary Disease	Percentage of Cases of Coronary Disease.
1920	1886	20	1.1
1921	1837	17	0.9
1922	1820	19	1.0
1923	1587	13	0.8
1924	1677	35	2.1
1925	1720	33	1.9
1926	1639	47	2.9
1927	1651	38	2.3
1928	1581	58	3.7
1929	2198	94	4.3
Total period	17,596	374	2.1

* Clinical diagnoses included are arteriosclerosis of coronary artery, thrombosis of coronary artery and infarct of heart. Cases filed under angina pectoris are also included if the record suggests that coronary disease was the basic pathologic state. Cases filed under more than one heading are counted only once.

found that coronary artery disease is more common and occurs earlier in life, at least in certain groups of industrial workers, than is generally believed. The clinical material included the male wage earners, their wives, who for the most part took care of their homes, as well as their children. All the patients were Jews, and the largest number of the wage earners were employed in the

garment industry. Of this group, 233 (38 per cent) were women, and 97 were children under 16 years of age, 84 per cent of the entire group being under 50 years of age. One hundred and three (17 per cent) had no cardiovascular disease, no functional murmurs and no neurocirculatory asthenia.

The diagnosis of *angina pectoris* was made only if the history revealed a

TABLE IV — AGE AND SEX DISTRIBUTION OF 615 PATIENTS REFERRED FOR CARDIOVASCULAR EXAMINATION

Ages	1-10		11-20		21-30		31-40		41-50		51-60		61-70		71-80		Totals	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Angina pectoris . . . .	.	.	1	0	1	.	9	5	23	5	10	5	3	1	.	.	45	16
Myocardial degeneration . . . .	.	.	1	0	1	.	5	0	31	4	6	4	2	0	.	.	45	8
Coronary thrombosis . . . .	.	.	1	0	1	.	7	0	30	2	14	0	4	0	.	.	55	2
Total coronary disease	7	3	1	1	1	1	21	5	84	11	30	9	9	1	1	1	145	26
Rheumatic	7	3	24	15	39	7	8	18	7	12	3	1	4	0	1	0	52	53
Noncardiac	4	5	16	11	29	3	7	9	26	8	3	3	6	4	0	1	65	38
Hypertension . . . .	.	.	.	.	.	0	6	13	20	26	8	10	18	1	6	7	36	56
Neurocirculatory asthenia . . . .	.	.	6	4	10	5	14	19	9	2	1	0	1	.	.	.	34	32
Functional systolic murmurs	13	5	9	5	14	0	2	4	3	1	1	0	2	.	.	.	28	16
Miscellaneous "Thyroid hearts"	0	1	2	1	3	1	3	4	8	1	2	0	3	.	.	.	16	9
Congenital	1	1	2	.	.	1	0	1	2	1	1	0	1	.	.	.	2	2
Syphilis of aorta . . . .	.	.	.	.	.	1	0	1	1	0	1	0	1	.	.	.	2	0
Totals	25	15	60	36	96	13	61	73	160	62	48	23	71	14	7	21	382	233
																	615	

M = male, F, female, T, total

typical Heberden's syndrome, *i.e.*, sub-sternal pressure or pain provoked by effort, compelling the patient to halt his activities. In many instances, there was typical radiation of pain to the left arm. *Coronary sclerosis* with *myocardial degeneration* was diagnosed when, in addition to the classic history, there were electrocardiographic changes, such as deformation of the S-T segment or the T-wave, or marked alteration of the Q-R-S complex. *Coronary thrombosis* was diagnosed when the history revealed a severe attack of sub-sternal pain, lasting 2 or more hours, accompanied by symptoms of shock, usually with subsequent cardiac insufficiency, compelling bed rest for a period of weeks following the attack. Most of the patients also exhibited electrocardiograms characteristic of myocardial injury, and those who did not, had such typical histories and physical manifestations that there could be no doubt as to the nature of the attacks. Only cases in which the symptoms were attributable to disease of the coronary arteries were included, cases of syphilitic aortitis, and aortic insufficiency of whatever origin were excluded.

Sixty-one patients had angina pectoris, 53 coronary sclerosis and myocardial degeneration, and 57 coronary thrombosis (Table IV). Thus, in about two-thirds of the cases of coronary artery disease there was definite evidence of myocardial damage when first examined. Seventy-one per cent. of the patients with coronary artery disease were under 51 years of age at the time of onset of their symptoms. Moderate or considerable cardiac enlargement was observed in more than one-half of all the cases. Sixteen women had only symptoms of angina pectoris, 8 had coronary sclerosis with myocardial de-

generation, and only 2 had coronary thrombosis

The reason for the high incidence of coronary artery disease in this group of patients, comprised largely of individuals under 50 years of age, is not apparent. Seemingly, it is not the result of an undue frequency of hypertension or diabetes mellitus, nor does obesity play a rôle. Hypertension was present in 71 or 41.5 per cent of the 171 cases of coronary artery disease. Twenty-six (15 per cent) of the 171 patients with coronary artery disease were women, and 22 of these women had hypertension, often of considerable degree, while only one-third of the men in this group had hypertension. Only 8 (4.7 per cent) of the 171 patients had diabetes, which low incidence can probably be explained by the comparative youth of the patients.

Since all the patients were Jews, it is possible that a *racial predisposition* is responsible for the high incidence of coronary disease. The frequency of angina pectoris among Jews and Italians, and its rarity among Negroes and Chinese have been explained by different authors as being due to difference in nervous constitution. The high-strung, sensitive individual is supposed to develop angina pectoris more readily than one who is phlegmatic and care-free. However, in view of the fact that one-third of their patients with coronary artery disease had coronary thrombosis and another third had evidence of myocardial degeneration, Boas and Donner are inclined to the belief that the *nervous system* plays an important secondary rôle in the genesis of these syndromes of coronary artery disease, and that some unknown factors, possibly such as *heredity, occupation or diet*, are more fundamental.

CONGENITAL MEDIAL SCLEROSIS OF CORONARY ARTERY.

R. W. Kissane and R. S. Fidler (Am Heart J 7 133 (Dec) 1931) report a case of congenital medial sclerosis of the coronary arteries with a review of the literature. The patient was a well-developed, newborn, white, gentile male, delivered by Cesarean section, who died 3 days later, following intermittent attacks of cyanosis and apnea. An electrocardiogram revealed a regular rhythm, rate 166, with inverted P and T waves and a convex R-T interval in Lead I. The family history, as well as the Wassermann reactions of both the mother and father, were negative, the mother had had no previous illnesses. Postmortem examination revealed slight cardiac enlargement. The coronary arteries, especially the right, were opaque, white in color, almost cord-like, quite prominent but not tortuous. Microscopical sections showed definite changes in the medial layer. The muscle cells could be easily identified just external to the inner elastic membrane, but passed rather abruptly into a zone of poorly staining, almost hyaline-like degeneration. This zone of connective tissue, as demonstrated by micro-acid-fuchsin stain, was approximately twice as thick as the muscle layer, and was entirely lacking in the sections of normal coronary arteries examined. The tunica intima and tunica externa were normal, and in none of the sections could evidence of cellular infiltration or of infection be found. The authors believe that this condition is present probably more frequently than the review of the literature would indicate, and suggest that all cases of so-called congenital idiopathic cardiac hypertrophy should be investigated for these pathological findings.

CORONARY OCCLUSION.—

Diagnosis.—Two cases are reported by C C Wolferth and F C Wood (Am J M Sc 183 30 (Jan) 1932) illus-

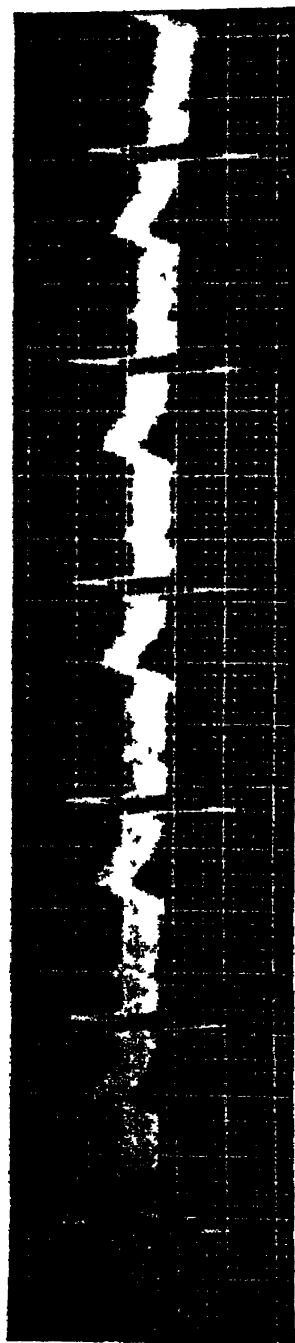


Fig 1—The normal contour of Lead IV—the anteroposterior chest lead. The P wave is usually inverted, a Q wave is generally present and the T wave is inverted (C C Wolferth and F C Wood Am J M Sc)

trating the value of an *anteroposterior chest lead* (Lead IV) in the *electrocardiographic diagnosis* of coronary occlusion. By use of Lead IV, they believe it is possible to bring to light in-

farcts in areas silent in the 3 conventional leads. Through study of 33 control cases (20 normal individuals and 13 patients with cardiovascular disease), the normal tracing in Lead IV was determined. As illustrated in Fig 1 the P wave is often inverted,* the Q-R-S complex is often of higher voltage than in the other 3 leads, and the T wave is usually deeply inverted. Deviations of the S-T interval from the isoelectric line did not occur in this group, and, therefore, it is presumed that such deviations in Lead IV have the same significance as when found in the 3 conventional leads, *i e*, "they are nearly, but not quite, pathognomonic of myocardial infarction."

The method of procedure was as follows:

"Pads moistened in warm saline were placed over the front and back of the chest, approximately at the cardiac level, just to the left of the midline. The ordinary German silver electrodes were placed over these pads. The anterior electrode was connected to the right arm lead wire. The posterior electrode was connected to the left arm wire. A simple method of holding the electrodes snugly in place was found to be the use of a $\frac{3}{8}$ -inch rubber tube stretched tightly around the chest over the electrodes and clamped at the ends with a hemostat. It is vital to have the resistance low, and to standardize the string accurately. Overshooting may produce changes in the electrocardiogram of normal individuals, which might be confused with significant S-T interval deviations. Rubbing the skin with alcohol, burnishing the electrodes and keeping the pads hot and closely applied to the skin are the main precautions necessary to prevent overshooting."

The 3 conventional electrocardiographic leads of one of their cases yielded little or no diagnostic information except on the fourth day. Lead IV, however, showed striking and unmistak-

* An inverted mirror image of this tracing with no Q-wave and an upright T-wave can be produced by reversing the lead wire.

able deviation of the S-T interval from the isoelectric line for 8 days after the original infarction. In the other case, both Leads I and IV showed evidence of coronary occlusion; but the S-T interval deviation was much more striking in Lead IV than in Lead I. In the light of the results in animal experimentation, the authors would expect an anterior infarct to give rise to an S-T interval depression in Lead IV, whereas a posterior infarct should produce an R-T elevation. Final evaluation of the usefulness of Lead IV in the localization of myocardial infarcts must necessarily await combined electrocardiographic and necropsy study of a series of cases.

PAIN IN MUSCULAR ISCHEMIA.—As the result of observations on the mechanism of pain arising from ischemia in working somatic muscle made by T Lewis, G W Pickering and P Rothschild (Heart 15 359 (July) 1931), T Lewis (Arch Int Med 49 713 (May) 1932) concludes that angular pain may be provoked (1) if the blood supply to the muscle becomes diminished while the work done remains constant, or (2) if the blood supply fails to increase adequately to the needs of a muscle that is called on to increase its work.

The exercise used in the original study was a simple gripping movement, with maximal contractions at the rate of 1 a second. During the exercise the circulation was arrested with a sphygmomanometer cuff distended to a high pressure on the upper arm. Pain began 25 to 45 seconds after the beginning of exercise, developing progressively, increasing in intensity, and rendering a continuation of exercise very disagreeable or intolerable at about the seventieth second. The pain has a peculiar

and characteristic aching quality, felt maximally in the region of the muscles most exercised, it is continuous, smooth, not increasing appreciably with the contraction of the muscle, being independent of the tension developed during the contraction of the muscle. It is not the result of cramp, for in none of their observations was there any sign of tonic contraction, relaxation being complete after each movement; nor is it the direct result of a lack of oxygen.

It is believed that the pain is determined by some chemical or physicochemical agency, named the pain factor or "factor P." When a muscle is exercised under ischemic conditions, factor P, once formed, remains unchanged; and, moreover, is cumulative, increasing in amount with each muscular contraction. It rises first to a level adequate to bring pain, and then to higher levels associated with increasing pain. Because it is stable during circulatory arrest, it maintains the pain between muscular contractions and after exercise has ceased.

If the circulation remained arrested after the development of pain, the pain continued at the same intensity as long as the circulation remained arrested; but after the circulation was released, it disappeared completely within from 2 to 4 seconds. If the circulation was re-arrested a little time after the release and the exercise was repeated, the time taken for pain to reappear was shorter than in the original exercise, and the amount of shortening was related to the shortness of the period of release intervening. It was found that the period of release between exercises must extend to 10 minutes if the times for the development of pain in the first and second exercise were to be made to correspond. This interval of 10 minutes

was considered the approximate time taken for the recovery of the muscle fiber. Furthermore, if the exercise was begun and the circulation was arrested some time later, the exercise being continued, the preliminary period of exercise with free circulation was found to be unaccompanied by pain, but the time taken for pain to develop in the subsequent period of exercise under ischemic conditions was shortened. Also, if the exercise was undertaken with the circulation free for a period of 2 minutes, and if the blood flow was then arrested and the exercise stopped simultaneously, there was no pain, but pain developed after a latent period of from 20 to 30 seconds and at times became severe within 1 minute. These observations indicated that during muscular exercise with free circulation the change within the muscle fibers that ultimately underlies pain occurs, but pain does not develop, since factor P cannot accumulate in the tissue spaces while these are under the influence of a free stream of blood.

In addition, when pain had developed in the usual exercise under ischemic conditions and had been abolished by release of the vessels, the pain returned after a latent period if the blood supply was rearrested. The latent period was shorter and the intensity of the pain developed was greater if the period of release was short. In this instance, factor P is reduced or abolished in the tissue spaces during release and accumulated on rearrest; the level to which it reaccumulated naturally depends on the amount by which the muscle fiber recovered during the release.

The final conclusion drawn was that "factor P acts in the tissue spaces, but is dependent on processes occurring

within the muscle fiber as a result of its contraction. When the blood flow is arrested, the process in the muscle and the accumulation of factor P in the tissue spaces occurs *pari passu*, with the circulation free, the same process occurs in the muscle fiber, but the condition of the tissue spaces is kept relatively unchanged."

Lewis points out that the symptomatology of acute *coronary occlusion* is one of the most powerful arguments for the theory that anginal pain is caused by muscular ischemia. He states "The pain of coronary occlusion is continuous, it does not come and go with the heart beat. It begins as a slight pain and grows steadily, and often rapidly, in intensity."

In explaining spasmodic anginal pain, attention is called to the fact that from the earliest days of the description of *angina pectoris*, the relation of the attacks to exercise and to emotion has been recognized. Under the theory of ischemia (and, as exemplified by the investigations of somatic muscle), if the blood supply remains constant, the attacks of pain will result from the increased expenditure of energy, this expenditure will increase when the tension (blood-pressure) is raised, it will also increase if the heart rate is increased, the tension remaining constant. Characteristic anginal pain at times occurs constantly during paroxysms of tachycardia, due to the fact that such paroxysms, while failing to raise blood-pressure, greatly increase the energy expended by the cardiac muscle. Lewis states that "it is easy to assume, because the blood-pressure and pulse rate are known to be raised by exercise under normal conditions, that exercise always raises them when it provokes anginal pain." He does not doubt that such

changes will be found, but feels that the assumption is dangerous until the pressures and rates have been read, and that the answer will come from appropriate observation and experiment

He also considers another type of *angina* that occurs *in patients at rest*. The cases almost always occur in male patients with free aortic regurgitation, often bedridden and at most capable of only slight exercise. They may live precariously for years, sudden death among them is common. The pain has the usual, though variable, characteristics of grave *angina pectoris*. In the earlier stages of the malady, the attacks of pain, which last from a few minutes to $\frac{1}{2}$ hour or more, may be provoked by exercise, in which case they bring the patient to a state of immobility. In later stages, when little exercise is possible, they occur while the patient is at rest and seem particularly prone to happen in the early hours of the morning, waking the patient from sleep. The attacks also occur by day and may be provoked by the ingestion of food or by the idea of food. A *distinctive feature* is a change of heart rate and of blood-pressure, both rising to high points. Amyl nitrite rarely fails to stop the pain in these cases (though it fails to bring relief in many instances of repeated *anginal* seizure). Although the pain definitely succeeds the rise in blood-pressure, the high pressure cannot be regarded as the sole determinant of the pain. Possibly, the coronary vessels are involved in the storm and acquire increased tone, and then, even if they are not actually constricted, they may fail to carry the extra stream of blood that the heart, beating under an unusual burden, requires of them. If pressure and pulse are raised in some other manner, as by exercise, the increased

burden may fall on a heart the coronary flow of which is freer, and thus pain may fail to occur. There is no warrant for regarding the coronary circulation as a purely passive system, the flow through which is governed merely by systemic pressure.

On the theory of muscular ischemia, it is not difficult to explain why *amyl nitrite* fails to give relief in the pain of coronary occlusion, nor why, at times, in *angina pectoris* the drug may relieve pain without lowering the blood-pressure, or why at other times the blood-pressure may fall without relief until later, or why the pressure may rise to a high point without causing pain, and, finally, why attacks that would otherwise last 10 minutes or longer are brought to an abrupt and complete end by the inhalation. In brief, the relief of pain by nitrites may come through an increase of blood supply, a decrease of expenditure of energy or by the combined effects of the two, and, furthermore, the effects of increased coronary flow on the muscle may long outlast the action of the drug.

ANGINA PECTORIS AND INTERMITTENT CLAUDICATION.

—*Treatment*—In a series of 20 patients with *angina pectoris*, given intramuscular "injections of an insulin-free extract of the pancreas by F. R. Nuzum and A. H. Elliot (Arch Int Med 49 1007 (June) 1932), 11 (55 per cent) were greatly benefited, 5 (25 per cent) were somewhat relieved, 2 (10 per cent) were not benefited, and 2 died suddenly during observation (presumably from coronary occlusion). The extract (a vasodilator that modifies the pressor effects of epinephrine and dilates the coronary arteries of the rabbit's heart to a degree exceeding that produced by the purine group of drugs)

was administered in doses of from 30 to 60 hypotensive units* on alternate days or twice weekly. Each patient received from 120 to 1140 hypotensive units (average for the group, 517.5 units), and the average period of observation for the group was 9.5 months. In a control group of 41 patients with angina pectoris who received the usual medical treatment and were followed for a like period of time, 14 (34.1 per cent) received pronounced benefit, 14 (34.1 per cent) experienced moderate relief, 10 (24.3 per cent) showed no benefit, and 3 (7.4 per cent) died.

Five patients with *intermittent claudication*, 1 with thromboangitis obliterans, and 1 with cerebral vascular spasms and angina pectoris were benefited in a pronounced degree with the extract. The duration of the benefit received from the injections was difficult of evaluation.

ELECTROCARDIOGRAPHY.—

DEEP Q WAVE IN LEAD III.—

N. M. Fenichel and V. H. Kugell (*Am Heart J* 7:235 (Dec.) 1931) studied the frequency of the large Q wave in Lead III of the electrocardiograms of 140 patients with cardiac disease. Pardee's criterion for a large Q wave was adopted, *viz*, a negative wave of more than 25 per cent of the maximum deflection in whichever lead the latter occurred. Of 30 patients suspected clinically of having *coronary artery disease*, the records of 13 showed a large Q wave in Lead III, and another presented a large Q wave in Lead II only. In this group of 30 cases, 27 presented left axis deviation. A large Q wave was present in the tracings of 3 other pa-

tients with advanced *rheumatic heart disease*, and of 2 patients with *congenital pulmonary stenosis*. In the records of an additional group of 35 necropsied cases, a large Q wave was found in 17 of 27 cases with evidence of *myocardial infarction or fibrosis*, while in the remaining 8 cases, in which there was no myocardial damage, none showed a large Q-3 wave.

The authors conclude that the large Q-3 wave is the most frequent electrocardiographic sign indicative of coronary artery disease during the chronic period, and that at times it is the only graphic clue to the pathological condition present in the heart. During the acute period of myocardial infarction, the large Q-3 and the other characteristic signs commonly occur together, but in the subsequent period the R-T segment usually becomes iso-electric and the T wave inversion becomes absent or limited to either Lead I or Lead III. In their minds, correlation of the electrocardiograms with the pathological findings indicates that the large Q-3 wave in myocardial infarction or fibrosis is probably due to involvement of the septum, particularly in its posterior portion.

In an extensive study of the incidence of the deep Q wave in Lead III of the electrocardiogram by J. Edeiken and C. C. Wolferth (*Ibid* 7:695 (Aug.) 1932), no significant Q-3 waves were discovered among 709 *apparently normal college students*; and among 117 *college athletes* the only significant Q-3 wave occurred in an individual with rheumatic heart disease (with systolic and diastolic murmurs at the apex). These findings reflect the rarity of this electrocardiographic change in the tracings of healthy adolescents and normal adults.

* The "hypotensive unit," as defined by Gley and Kisthinos, is the amount of the extract injected intravenously which is sufficient to cause a barely perceptible fall in the blood-pressure of a rabbit weighing 2 kilograms.

In 1900 *unselected electrocardiograms* of ward, clinic and private patients of all ages, 78 (41 per cent) showed significant Q-3 waves. Of the latter, 63 (84 per cent) had cardiovascular disease, 7 were doubtful cases, 5 were considered negative, and 3 were not classified because of inadequate records. With the exception of the Q-3 wave changes, the electrocardiograms were otherwise normal in 38 cases, there were T wave changes in 32, the Q-R-S complexes were slurred in 4, and 4 showed various degrees of heart block. In this group the marked predominance of angina pectoris and coronary occlusion among the private patients as contrasted with the ward and clinic patients was striking. Rheumatism, syphilis and goiter were found more frequently among the ward and clinic patients.

A significant Q-3 wave was present in the electrocardiograms of 31 (approximately 6 per cent) of 500 patients with *definite cardiovascular disease* from the wards and out-patient cardiovascular clinic. Although all ages were included, the youngest patient with a significant Q-3 wave was 32 years of age, and the oldest 72 years. The etiological diagnoses of the patients with the significant Q-3 wave were as follows:

I Rheumatic type, 3 cases (a) mitral stenosis, 1, (b) mitral stenosis and aortic insufficiency, 2

II Hypertension and / or arteriosclerosis, 15 cases

III Syphilis, 8 cases, (a) aortitis, 5, (b) aortitis and aortic insufficiency, 2, (c) aneurism, 1

IV Thyrotoxic heart, 1 case

V Etiology undetermined, 4 cases

Thirty-one (26.7 per cent) of 116 cases with the *anginal syndrome* (angina pectoris, or coronary occlusion, or

both) showed significant Q-3 waves. The majority (62 per cent of the entire group) showed a left axis deviation, the Q-R-S complex of Lead III in many showing (1) a small upright wave followed by a deeply inverted wave and occasionally by another upright wave, (2) a single inverted wave, or (3) an inverted wave followed by an upright wave. Tracings repeated later in some of these patients showed changes in the Q-R-S complexes which, although slight, were sufficient (according to Pardee's criteria) to compel a reclassification. Eight (55 per cent) of the electrocardiograms of 145 *corporation executives* showed a significant Q-3 wave, and 7 of these 8 were found to have definite heart disease when studied clinically and fluoroscopically, although none gave a history suggestive of the anginal syndrome.

With the finding of a total of 149 significant Q-3 waves in the 5 groups studied, the electrocardiogram being otherwise normal in 68 cases, showing T wave changes in 64, and other electrocardiographic abnormalities in 17, the conclusion was drawn that *this sign may constitute the first electrocardiographic change to call attention to the possibility of cardiac damage*.

In order to determine whether a high diaphragm favors the production of a significant Q-3 wave, electrocardiograms were made of 25 *pregnant women* in the ninth month of pregnancy. Three significant Q-3 waves were found at that period, and in electrocardiograms of 2 of 3 patients, repeated several months after delivery, the large Q-3 waves were no longer present.

In view of the fact that available evidence indicates that the conditions chiefly responsible for deep Q-3 waves are either (1) a lesion of the septum

which interferes with the spread of the excitatory process, or (2) deviation of the septum from its usual position with reference to Lead III, Edeiken and Wolferth attempted to produce a significant Q-3 wave in human subjects with presumably normal hearts by taking tracings with the body in various positions. Contrary to the conclusions of Fenichel and Kugell (*supra vide*), they believed that in the majority of cases the important factor in the production of the deep Q-3 wave is change in position rather than injury severe enough to alter the spread of the excitatory process in the myocardial tissues. Their studies were in line with the observations of W J Meek and A Wilson (Arch Int Med 36 614 (Nov) 1925), who in experiments on dogs demonstrated the marked influence of rotation of the heart on the Q-R-S complexes of the electrocardiogram. Edeiken and Wolferth obtained marked changes in the Q-R-S complexes, but a deep Q-3 wave was not produced. However, by rotating the plane of the lead in relation to the heart, effected by leaving the left arm electrode in position and transferring the left leg electrode to the region of the angle of the left scapula, a change in the Q wave was produced. From these considerations and the improbability that in the material studied by them infarction of the septum or other damage severe enough to modify the course of the excitatory process was present in more than a small minority of the cases, change of position is seemingly the important factor in the production of the significant Q-3 wave. However, the factors which determine rotation of the septum in human hearts are not well understood, and, therefore, when attempting to evaluate the clinical sig-

nificance of the deep Q-3 wave, it is important to bear in mind that deep Q-3 waves occasionally occur in patients who show neither evidence of cardiac disease nor changes from the normal in the size and position of the heart.

DURATION OF ELECTRICAL SYSTOLE OF HEART.—In a study of 21 patients with definite cardiac disease, with regular rhythm, K Berliner (*Ibid* 7 189 (Dec) 1931) found that digitalis shortened the duration of the Q-T interval, the electrical systole, up to 41 per cent in every case. The shortening always took place in the S-T interval, while the Q-R-S interval was neither definitely prolonged nor shortened. Measurement of the Q-T interval was found more reliable than the older methods in estimating the digitalis effect on the heart.

In a group of 54 patients with normal rhythm and a Q-T interval prolonged 10 per cent or more above normal, 24 (44.4 per cent) had arterial hypertension, and in a smaller group of 20 patients with a Q-T interval prolonged 20 per cent or more above normal, 12 (60 per cent) had arterial hypertension. Prolongation of the electrical systole was usually associated with cardiac enlargement. However, that it does not indicate poor prognosis was shown in a third series of patients, consisting of 14 fatal cases of aortic insufficiency, of which only 4 (29 per cent) showed marked prolongation of the Q-T interval.

HEART IN FUNNEL CHEST.—In a study of 10 cases of funnel chest of moderate or severe degree, J Edeiken and C C Wolferth (Am J M Sc 184 445 (Oct) 1932) found the heart to be displaced to the left and upward. In severe cases, the apex may reach the anterior axillary line. On

fluoroscopic examination, the under surface of the heart can be seen to an unusual extent, in some cases being raised from the diaphragm to such extent that in inspiration a clear intervening space is present. The heart appears somewhat larger than normal, but is more transparent than a hypertrophied heart. It is enlarged in its transverse diameter, but the anteroposterior diameter is decreased (see illustration)

any consistent deviation of the electrical axis, probably because the heart is displaced as a whole. Uncomplicated funnel chest seemingly has no clearly defined effect upon the functional capacity of the heart, unless the deformity is traumatic or sudden. The lack of symptoms in the vast majority of cases can probably be explained by the slow development, which allows for accommodation within the chest and heart.

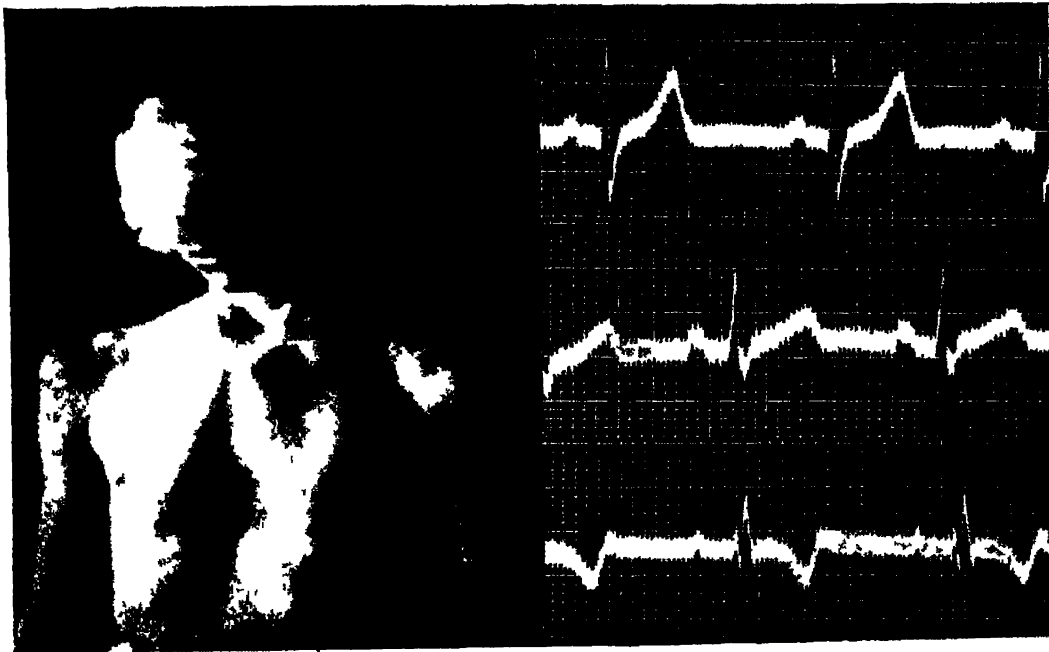


Fig 2—Congenital funnel chest in boy, aged 11 years. The heart is markedly flattened in the anteroposterior diameter and is displaced to left and slightly upward (J Edeiken and C C Wolferth Am J M Sc)

According to H Rosler, the ratio of the anteroposterior to the transverse diameter of the normal heart is about 0.7 to 1. In funnel chest this ratio is often reduced to 0.5 to 1, or less. Instead of the sternum forming the anterior chest border there is a large air-containing space formed by the bulging right and left chest. Occasionally, because of the asymmetry of the depression, the heart can be seen pulsating in front of the plane of the sternum. Although there is displacement of the heart, electrocardiograms fail to show

HYPERTENSION, ESSENTIAL (PRIMARY).—In a clinical and postmortem study of 375 cases of primary (essential) hypertension made by F D Murphy, J Grill, B Pessin and G F Moxon (Ann Int Med 6.31 (July) 1932), the cases were divided into 3 groups, *viz*, (a) the *functional*, (b) the *arteriosclerotic*, and (c) the *arteriolonecrotic*, and an attempt was made to show that the varieties of clinical and morphological changes observed were manifestations of different stages of one process. Cases of hypertension

TABLE V

CAUSES OF DEATH IN 375 AUTOPSIED CASES OF ESSENTIAL HYPERTENSION

	Group I		Group II		Group III		Total	
	No.	Per Cent.	No	Per Cent	No	Per Cent	No	Per Cent
1 Heart disease	10	23.3	171	56.4	7	24.1	188	50.0
2 Renal failure	0	0	23	7.6	16	55.2	39	10.4
3 Apoplexy or thrombosis and embolism	0	0	45	14.9	5	17.2	50	13.4
4 Infections	12	27.9	40	13.2	1	3.5	53	14.2
5 Miscellaneous	21	48.8	24	7.9	0	0	45	12.0
Total ..	43	100.0	303	100.0	29	100.0	375	100.0

TABLE VI

AGE INCIDENCE IN 375 AUTOPSIED CASES OF ESSENTIAL HYPERTENSION

Age	Group I		Group II		Group III		Total	
	No	Per Cent	No	Per Cent	No	Per Cent	No	Per Cent
10 to 20	0	0	0	0	3	10.4	3	0.8
21 to 40	9	21.0	8	2.64	7	24.1	24	6.4
41 to 60	23	53.5	65	21.5	15	51.7	103	27.3
61 to 80	10	23.2	166	54.8	4	13.8	180	48.1
81 to 100	0	0	35	11.5	0	0	35	9.4
Unknown	1	2.3	29	9.6	0	0	30	8.0
Total	43	100.0	303	100.0	29	100.0	375	100.0

in which symptoms appeared to be independent of the vascular lesions were placed in *Group I*, which might be termed the functional stage. The 43 patients in this group died of causes independent of cardiovascular-renal disease, the chief causes of death being an accident, an operation, or an intercurrent infection.

Group II was composed of cases with arteriosclerosis of peripheral as well as internal arteries, representing a stage of slow progression. The symptoms were those produced by arteriosclerotic narrowing of the lumina of arteries, leading to ischemia and slow fibrosis. Heart failure, renal failure and thrombosis appeared among the 303 patients in this stage. The remaining 29 cases, who comprised *Group III*, had the fol-

lowing distinctive clinical features: (a) persistent excessive hypertension, (b) violent headaches, (c) rapid downward course, (d) sudden loss of weight and strength, (e) typical retinal changes, (f) a course resistant to treatment, and (g) a termination with a functional breakdown of some essential organ, usually the kidney or the heart. In this group there was an advanced severe diffuse arteriosclerosis with necrotic lesions of the arterioles of various organs.

ANALYSIS OF CLINICAL DATA.—The *causes of death* in the entire series are shown in Table V. Heart disease caused death in 188, or 50 per cent. One hundred and seventy-one (56.4 per cent) of the cases in *Group II* died of heart disease, while in *Group III* only 7 (24.1 per cent) had

heart failure In sharp contrast to the number of deaths caused by heart failure was the low mortality rate from renal failure Only 39 (10.4 per cent) of the whole series died of renal failure, 23 (7.6 per cent) occurred among the cases of Group II, and 16 (5.5 per cent) among those of Group III In Group II, uremia followed a slowly progressing renal failure, but in Group III it developed suddenly and caused early and rapid death It was unexpected to find that only 45 (14.9 per cent) of the patients in Group II died of cerebral hemorrhage or thrombosis, while 5 deaths (17.2 per cent) from apoplexy in Group III were not exceptional

The ages of the patients ranged from 9 to 100 years, as shown in Tables VI and VII In Group III (malignant)

TABLE VII .

A COMPARISON OF AGES OF PATIENTS
IN GROUPS I, II, AND III

Age	(Benign) Groups I and II	(Malignant) Group III
0 to 10	0	1
11 to 20	1	2
21 to 30	3	2
31 to 40	12	6
41 to 50	36	7
51 to 60	56	7
61 to 70	100	4
71 to 80	80	0
81 to 100	30	0
Total	318	29

62.3 per cent of the individuals were under 50 years of age, while in Groups I and II (benign) only 16.3 per cent. were under 50 years of age

Throughout the 3 stages there were 2 unifying clinical factors, *viz*, *hypertension* and *left ventricular hypertrophy* At autopsy, left ventricular hypertrophy was present in 263 cases (79.4 per

cent), there was no cardiac enlargement in 68 cases, and in 44 there was no record (Table VIII) Of the 263 cases of proved hypertrophy, only 182 were recognized clinically The 2 chief clinical manifestations of heart disease were *angina pectoris*, and the syndrome of *left ventricular failure* Angina pectoris occurred in 42 cases (11.2 per cent of the 375 patients) Pain in the heart area was the first symptom of heart disease in approximately 18, or 5 per cent of all patients having heart failure In 105 (55.8 per cent) of the 188 patients dying of heart disease, the syndrome of left ventricular hypertrophy was the first subjective evidence of any disorder This classical syndrome, characterized by paroxysmal dyspnea, usually worse at night, palpitation and a sense of distress in the cardiac area, developed in every case of heart failure from hypertension With the onset of paroxysmal dyspnea, the patient's prognosis was distinctly bad, however, a few patients recovered and died in later years of heart failure or apoplexy Palpitation, although frequently present, was the first symptom in only a few cases Murmurs, most frequently heard in the mitral area, were recorded in 85 cases (22.6 per cent of the whole series) Aortic systolic murmurs were noted only in 52 cases (13.8 per cent), and soft blowing diastolic aortic murmurs were found only occasionally Gallop rhythm, which was frequently indicative of a progressive left ventricular failure, was found in 95, or 50.5 per cent of the 188 cases of heart failure. The most common electrocardiographic changes were left ventricular preponderance, and evidence of left bundle-branch block; however, many cases had normal electrocardiograms

TABLE VIII

HEART WEIGHTS IN 375 CASES OF ESSENTIAL HYPERTENSION

Heart Weights	Group I		Group II		Group III		Total	
	No	Per Cent	No	Per Cent	No	Per Cent	No	Per Cent
Normal weight	18	41 85	50	16 5	0	0	68	18 13
400 to 600 grams	14	32 55	151	49 84	14	48 27	179	47 74
600 to 800 grams	7	16 3	51	16 83	9	31 03	67	17 87
800 to 1000 grams	0	0	14	4 62	3	10 35	17	4 53
Not recorded	4	9 3	37	12 21	3	10 35	44	11 73
Total	43	100 00	303	100 00	29	100 00	375	100 00

Although an arteriosclerotic contracted kidney was commonly found at autopsy, *uremia* was a rare complication, occurring in only 39, or 10.4 per cent of all cases. The urea clearance test was found to be the most satisfactory test in giving information of early renal failure. In Group III, sudden and early uremia occurred as a result of the necrotic and thrombotic renal complications of the arteriosclerosis, while in Group II the ischemic atrophy of the kidney was a slower process, requiring months or years to render the kidneys completely insufficient. Albuminuria was a constant feature of all cases in both groups with renal failure. Edema of the nephritic type did not occur in this series. There was no hypercholesterolemia found, and doubly refractile bodies were not present in the urine of patients with edema. Edema, when present, was of the cardiac variety.

Apoplexy was the cause of death in 50, or 13.4 per cent of all cases. There were 2 cases of renal hemorrhage; 1 case of hemoptysis (without evidence of tuberculosis), 1 case of hematemesis, and epistaxis occurred not infrequently. Vascular crises producing transient hemiplegia or aphasia with monoplegia were observed in 4 instances. A few cases in Group III suffered periodic attacks of abdominal cramps and severe

headache. Such attacks were believed to be due to vascular crises involving visceral arteries of the abdomen and of the brain respectively, and remained for periods varying from several hours to several days. Two cases in Group III developed hemorrhages into the skin resembling purpura hemorrhagica, in both instances the disease progressed rapidly to a fatal termination.

In accordance with other observers, the *vascular changes in the retina* were found to be one of the best indicators of the degree of vascular changes throughout the body. In the cases of early essential hypertension (Group I), the retinal examination revealed no abnormalities, and in cases of longer duration, evidences of arteriosclerosis were usually present. Narrowing of the arterioles with increase of the light-reflex of the arteries, tortuosity of the arteries and arteriovenous compression were the usual features. Occasionally there were small hemorrhages along the course of some of the vessels, and at times white patches were seen, probably produced by an old healed hemorrhagic area. The discs in this group were clear, and edema of the retina was mild.

In Group II, the retinal arteriosclerosis was usually a slowly changing process corresponding in general with the vascular changes in the kidney and

in other organs of the body. The lack of destructive changes in the discs was in sharp contrast with the lesions seen in the more advanced cases of Group III (malignant). Lesions of the fundi were always found in Group III, and were characterized by papilledema, hyperemia of the discs, and constriction of the arteries, leading to the appearance of thin white lines buried in the retinal edema.

Hemorrhages along the course of the arteries were frequently found. White patches were seen which corresponded to what has been designated "cotton wool" patches. These patches seemed fresher and had irregular borders that appeared to merge with the generalized edema of the retina, lacking the clear-cut features of those white patches seen in Group II. In 3 cases of Group III a previous diagnosis of brain tumor had been made upon the eye-ground changes, in 2 cases the characteristic changes in the fundus were present before any evidence of renal damage occurred. In 1 case in Group III the advanced fundus changes were absent. When the typical retinal changes were found, it was fairly certain that breakdown of the individual would follow in a period of several months.

ANALYSIS OF PATHOLOGICAL DATA.—In Group I the main feature was a mild *arteriosclerosis* involving chiefly larger and medium-sized arteries of organs such as the kidney, liver and spleen, in Group II there was a more advanced *arteriosclerosis* of the smaller as well as the larger arteries of the kidneys and other organs, and the essential change in Group III was an intense, diffuse *arteriosclerosis* extending into the smallest arteries and arterioles, producing at times an *arteriolo-necrosis*.

Twenty-one of 39 *hearts* in Group I were above normal weight, 216 (81 per cent) of 266 in Group II were hypertrophied, and in Group III hypertrophy was present in every case recorded (Table IV). Coronary artery disease, characterized grossly by occlusion of a large branch from thrombosis or a decided narrowing due to *arteriosclerosis*, was found in 44, or 25.7 per cent of 171 cases examined in Group II. In these cases myocardial infarcts or scars and diffuse fibrosis of the heart muscle were present. In no case in Group III was there macroscopic evidence of complete coronary artery occlusion, although coronary sclerosis with narrowing was always found. *Arteriosclerotic* lesions of the aortic valves, leading to deformity and insufficiency, were occasionally observed. Less often, the mitral valve was involved in the *arteriosclerotic* process. The arterioles of the myocardium were usually normal.

The size and appearance of the *kidneys* were decidedly variable. In Group I the kidneys were always either normal in size or larger than usual, and the surface was smooth. The average weight in 33 cases was 181.5 Gm. Evidences of *arteriosclerosis* were confined to the larger branches, and yellow streaks in the intima due to lipid deposits were frequently the only sign of disease. Microscopically, the changes in Group I were few, being substantially the same as those in nonhypertensive individuals of the same age. The arterioles and the smaller portions of the interlobular arteries were normal. Occasionally there were areas with *arteriosclerosis* of the medium-sized arteries along with foci of hyalinized and fibrosed glomeruli. Such lesions were the same as those found in the later stages, except that they were so few in number that they

might be looked upon as normal. Most glomeruli were normal in size, some were hypertrophic, and a few were atrophic. The tufts undergoing atrophy showed various grades of hyaline and fatty degeneration and fibrosis. In Group I, and in some cases of Group II representing the earlier stages of arteriosclerosis, focal thickening of the glomerular basement membrane was observed.

In Group II, the average weight of the kidneys in 205 cases was 133.5 Gm, the largest weighed 280, and the smallest 90 Gm. Grossly, the kidneys were of the shrunken granular type, the cortex was narrowed, and there was an accumulation of fat in the renal pelvis. The predominant lesion was an arteriosclerosis of the larger and medium-sized arteries, however, in some cases there was an extension of the process into the smaller and smallest branches of the interlobular artery, and occasionally the arterioles were involved. Many glomeruli were almost of twice normal size, and at the same time many were shriveled and atrophic. Capsular thickening was found, varying from a slight proliferation of connective tissue to a thick ring of scar tissue which seemed to obliterate the capillary tuft.

Associated with this were areas of interstitial fibrosis, round cell infiltration and periglomerular fibrosis. Hyaline and fatty degeneration of afferent arterioles, with extension of the degeneration into the glomeruli, were frequently seen. A distinct feature was the diffuse thickening of the capillary basement membrane, which, in contrast to the earlier stage seen in Group I, was almost universal in many cases. Although in Groups I and II the essential histological lesion was an arteriosclerosis, the chief contrasting feature was

the degree of involvement of the various organs. Of the lesions present in all organs, those in the kidney were found to be the most accurate index of the progress of arteriosclerosis.

In the 29 cases of Group III, the average weight of the kidneys was 115 Gm, the largest weighed 255, and the smallest 29 Gm. The kidneys were usually of the contracted granular type. Occasionally they were larger than normal with a smooth surface, or of normal size without granulation. Extensive subcortical hemorrhages were present in all but 5 cases, small hemorrhages in the mucosa of the pelvis were constantly found, and in several instances there were blood clots with evidence of larger hemorrhages from the kidney.

Microscopically, the foudroyant destructive lesions in Group III were in sharp contrast with the benign sclerosis of Groups I and II. The most characteristic feature was a severe diffuse arteriosclerosis of the smaller and smallest arteries and arterioles. In some cases, necrosis of arterioles with thrombosis of corresponding capillary loops was a frequent change, and, in others, extensive severe arteriosclerosis with little or no necrosis dominated the picture. Focal infiltration with lymphocytes, plasma cells and occasionally polymorphonuclear leukocytes was a feature of all cases. Alteration of the tubules was constantly present. Areas of dilated tubules with low atrophic epithelial cells were adjacent to islands of compressed atrophic tubules surrounded by increased stroma.

Fatty and granular degeneration of the epithelial cells of the tubules, with necrosis in some portions, was frequently observed. Damage of the glomeruli was a constant change. Many glomeruli were larger than normal and the

capillary loops were normally filled with blood, others were smaller and more cellular than normal and the loops were bloodless, and, again, at times the capillary loops appeared to be engorged with red blood cells. The increase in cellularity consisted in an increase of the endothelial and epithelial cells.

Analysis of the cases suggested that the typical clinical syndrome may precede the onset of necrosis of renal arterioles, and, furthermore, that heart failure, apoplexy, or some other complication may terminate the patient's life before renal necrosis occurs. More important than necrosis was the diffuse intense arteriosclerosis leading to narrowing and obliteration of the lumina of the smallest arteries and arterioles with subsequent ischemia and degenerative changes in the glomeruli.

Histological studies of the *spleen*, *liver* and *pancreas* revealed vascular lesions which paralleled those of the kidney quite uniformly. In 2 cases of Group III a few necrotic lesions were seen in the spleen.

The arterioles of *skeletal muscle*, usually the pectoralis major, were examined in all cases of Group III, and in 124 cases of Groups I and II. In Group III, hypertrophy of the media was constantly found, moderate to advanced hypertrophy was also observed in 57 cases of Group II. Occasionally, proliferation of the intima was observed in these cases.

In final analysis, the *relationship of the 3 groups* of cases of essential hypertension was shown by the presence of such unifying factors as hypertension, cardiac hypertrophy, and arteriosclerosis, especially of the renal arteries and arterioles. The wide variety of symptoms and lesions encountered clinically and histologically was dependent upon

several factors, the chief of which were the location, degree and speed of development of the arteriosclerotic lesions. There appeared to be no constant relationship between the height of the blood-pressure and the rate of progress or extensiveness of the arteriosclerosis.

In some cases there were no symptoms in the presence of high pressure over a period of years. Undoubtedly, however, hypertension is an important influence in the production of arteriosclerosis, yet the inherent quality of the arteries themselves, and especially their ability to withstand strain, seems to be a more important factor. In Group I, death occurred independently of the hypertension and associated vascular disorders. Ill-defined complaints or a total absence of symptoms characterized this group clinically. However, no case was observed in which there was no renal arteriosclerosis, but the changes were no more extensive than in nonhypertensive individuals of the same age. As pointed out by various investigators, there is a parallelism between the early symptoms of essential hypertension and certain psychic states.

Apoplexy, *heart failure* and *renal failure* were the *chief complications* observed in Groups II and III, as shown in Table I. In sharp contrast to the cases in Group III, the process in Group II appeared to develop slowly, and, therefore, the patients in Group II lived longer free from complications than those in Group III. Histologically, no necrosis occurs in Group II, there being merely a generalized arteriosclerosis of the larger and medium-sized arteries with a focal arteriosclerosis of the smallest arteries and arterioles. Occasionally, however, this benign process leads to almost complete fibrosis of a sufficient number of the glomeruli to

produce renal failure. The latter was observed in 23 cases (76 per cent) in Group II.

Most cases of essential hypertension never progress into the malignant type (Group III), in that they end fatally from some complication of simple arteriosclerosis in Group II. It is not definitely known why a few patients with simple arteriosclerosis do develop into the rapidly progressing type of arteriosclerosis with necrotic lesions in the arterioles. Volhard and Fahr (1914) believed that the benign and the malignant renal sclerosis were different forms of disease and not different stages, and assumed that in the malignant type a toxic inflammatory factor is added to a kidney already damaged by arteriosclerosis.

Recently, in a study of "malignant nephrosclerosis," P. Klemperer and S. Otani (Arch Path 11:60 (Jan) 1931) concluded that essential hypertension with renal failure may be associated either with a slowly progressing type of arteriosclerosis leading to renal failure, or with a more rapidly developing vascular change in which severe renal atrophy is absent. The latter "malignant" phase was divided into 2 classes, based on vascular lesions, as follows: (1) an "accelerated atherosclerotic" form, with necrosis of the arterioles with extreme cellular intimal thickening of larger interlobular and arcuate arteries, and degenerative, proliferative, and slight exudative focal glomerular lesions, in which an ischemic mechanism is responsible for the lesions, and (2) the "arteritic form of malignant nephrosclerosis," recognized in 2 cases, with necrotic lesions associated with perivascular inflammatory reaction, endarteritis and periarteritis. In the latter, there was present a definite morbid process,

recognized as toxic in origin. Murphy and his coworkers were able to discover only 1 case which would fulfill the requirement of the arteritic type.

From their observations, Murphy, Grill, Pessin and Moxon (*loc cit*) conclude that the only difference between the *malignant* and the *benign* forms of essential hypertension is in degree, and that no additional inflammatory influence is necessary for the development of the change seen in the so-called malignant stage.

PERICARDITIS.—ADHERENT PERICARDITIS.—In a study of 144 cases of adherent pericarditis in which the patients came to autopsy at The Mayo Clinic, H. L. Smith and F. A. Willius (Arch Int Med 50:171 (Aug) 1932) found that no physical signs occurred with sufficient uniformity to permit of their being considered characteristic of the condition. *Etiologic diseases* occurred in the following order: (1) rheumatic fever (21.5 per cent), (2) intrathoracic infection (17.4 per cent), (3) cardiac infarction (6.2 per cent), (4) syphilis (2.8 per cent), and (5) neoplastic invasion (2.8 per cent). A marked predominance of the incidence (69.4 per cent) occurred in males. The average weight of the heart in 105 cases in which it was known was 478.1 Gm, the minimal weight being 135 Gm, and the maximal 950 Gm. The average weight in 42 cases with complete obliteration of the pericardial sac was 472.7 Gm; in 57 cases with partial obliteration of the pericardial sac, 506.5 Gm; and in 6 cases with parietal adhesions, 251.2 Gm. Partial calcification was present in 15 cases (10.4 per cent).

Associated cardiac diseases occurred in 77 cases (53.5 per cent). In order of frequency, these diseases were (1)

coronary sclerosis (21.5 per cent), (2) rheumatic heart disease with mitral stenosis (17.4 per cent), (3) hypertensive heart disease (7.6 per cent), (4) rheumatic heart disease with aortic insufficiency (4.2 per cent), and (5) aortic syphilis (2.8 per cent). The youngest patient with coronary sclerosis was 31 years of age, and the oldest, 85 years. In 57 cases (39.5 per cent), the predominant clinical syndrome was referable to the heart, while in the remainder it was in no way related to the heart. Death from heart disease occurred in 39.5 per cent of the cases, the predominant syndrome being congestive failure. In 12 cases, death occurred very suddenly, 9 being cases of coronary artery disease. Detachment of mural thrombi resulting in fatal emboli occurred in 4 cases, and 2 patients died from subacute bacterial endocarditis (*Streptococcus viridans*).

In making the diagnosis of adherent pericarditis, there should be careful consideration of etiologic factors, which at times may be the only positive clue to the identification of the condition. The absence of so-called classic signs of adherent pericarditis does not in any way justify failure to recognize the condition. Furthermore, the presence of other cardiac disease does not minimize the probability of the presence of adherent pericarditis, in fact, it may frequently increase the probability of its existence. The presence of a large heart, in the absence of valvular lesions, of hypertension, of evidence of previous elevation of blood-pressure, and of a clinical history that would indicate previous cardiac infarction, should at once suggest the possible existence of adherent pericarditis.

Smith and Willius (*Ibid* p. 184) also report a study of 16 cases of proved

*calcification of the pericardium** All of the 16 patients had extensive chronic adhesive pericarditis. In 15 of the cases the diagnosis was established at necropsy, and in 1 case in life (by x-ray examinations). Among the 15 subjects who came to necropsy, 12 were males and 3, females. The youngest subject was 24 years of age, and the oldest, 84 years. The single etiologic factor that affected the largest number of patients was *rheumatic infection*, which was present in 6 of the 15 cases. Tuberculosis was not present in any one of the 16 proved cases, but was present in 1 of 4 other unproved clinical cases described. In 10 cases failure of the heart was the primary cause of death. It would appear that calcification of the pericardium is a sequel of extensive chronic adhesive pericarditis, and is an end-result of the same inflammatory process that produces that condition. It does not occur commonly, for it was present in only 15 of 144 cases of chronic adherent pericarditis found in the course of 8912 postmortem examinations. Recognition of deposits of calcium in the pericardium by x-ray examination may be an aid in making the diagnosis of chronic adhesive pericarditis, which condition is extremely difficult to recognize (as pointed out in the article immediately preceding).

Shipley (Surg Gynec Obst 54:280 (Feb) 1932) states evidence is accumulating that makes it incumbent upon the clinician to distinguish clearly between the different phases of chronic pericarditis. There are 4 of these: adhesions between the pericardium and pleura, adhesions between the pericardium and heart—these two rarely call for surgery; adhesions between the heart, pericar-

* Also called "pericarditis calcuosa," "concretio pericardii," "armored heart," etc.

dium and chest wall, which, if disabling, call for the Brauer operation, and constricting pericarditis, for which disabling disease pericardiectomy is indicated. Evidence is also accumulating that in the last condition, surgical intervention should be considered seriously and operation, if it is to be helpful, requires ample exposure and careful freeing of the entire heart.

In a clinical study of *concretio cordis*, covering observations on the venous pressure and cardiac output, C S Burwell and W D Strayhorn (Arch Surg 24 106 (Jan) 1932) present a study of a patient of this type.

A male, aged 36, complained of dyspnea and generalized swelling. Clinical examination revealed distention of the cervical veins without diastolic collapse. The radial pulse was regular, small, typically paradoxical, and blood-pressure 118/104. Fluid was found in both pleural cavities. "*The heart did not seem enlarged to percussion*". There was no demonstrable shift in position of the heart with change in position of the body. The sounds were distant. No murmurs. Abdominal wall was edematous, fluid wave demonstrable, liver 8 cm below the costal margin. Fluoroscopy and x-rays showed slight enlargement of the cardiac shadow to the right. It was very difficult to make out any pulsations.

In the analysis of the findings they say. "The patient thus exhibited in high degree the signs of back pressure from the right ventricle of the sort associated with failure of that ventricle. There was, however, no evidence of hypertrophy of the right ventricle nor of any valvular or pulmonary disease to account for the failure. Moreover, the cardiac impulse was neither seen or felt, both the cardiac dullness and the electrical axis failed to shift with change in the position of the patient, and no movement of the border of the heart was seen under the fluoroscope. Accordingly, a tentative diagnosis of adhesive peri-

carditis was made of the type described by Volhard and Schmieden as *concretio cordis*. "The essential defect, as revealed by these studies, was the limitation of the diastolic relaxation of the heart by the encircling scar tissue, and the consequent fixation of the output per beat at an abnormally low level. This limitation of the output per beat made it impossible for the output of the heart per minute to increase except so far as this could be brought about by an increase in the already rapid rate. The edema, however, was not due to the diminished cardiac output, but, certainly in the main, to the elevated venous pressure. That this is so, is indicated by the distribution of the edema in the patient's body. In the presence of diminished flow of blood through the lungs there were no signs of pulmonary edema during life nor any visible passive congestion of the lungs after death. massive edema occurred in the parts of the body in which the pressure in the veins was increased."

Operative Treatment—I A Bigger (*Ibid* 24 574 (Apr) 1932) reports on the operative treatment of the above patient, and another studied by Burwell and Strayhorn (*loc cit*) postoperatively and reported in the same paper. As preliminary, he states that the surgical problems involved in the treatment for *concretio cordis* are distinctly different from those involved in the treatment for mediastinopericarditis. In mediastinopericarditis the main indication is relief from interference with the systolic contractions of the heart. In *concretio cordis*, the thickened pericardium contracts about the heart and prevents adequate filling of the chambers during diastole. In some cases there are adhesions between the thickened pericardium and the surrounding structures.

In any case, the primary difficulty is with diastole, and relief can be expected only from a release of the heart by removal of the constricting membrane. This was first advocated by Delorme in 1898, but was not carried out until 1913, when Sauerbruch successfully performed the operation.

Bigger (*loc cit*) advocates incision of the Brauer type, favoring it because it gives relative access to the left breast as well as the right, because it can be employed without the creation of a pneumothorax, with the consequent disturbance of intrathoracic pressures, and because of the subsequent anterior thoracic wall mobility. Shipley (*loc cit*) favors the approach described by H. H. Kerr and J. O. Warfield, Jr. (Ann Surg 88:607 (Sept) 1928).

Cutter advocated that the operation be divided into at least 2 or possibly 3 stages. He has suggested that the first stage consist of a Brauer pericardiolysis, and that at the second stage the pericardium be removed from the surface of the left ventricle, and also from the right ventricle if it is felt that the patient's condition will stand such an operative procedure. C. S. Beck (*loc cit*) recommends removal on the left side first, so that the left heart is prepared to receive blood when the right is relieved, else the right heart will dilate.

"The actual removal of the thickened pericardium may be extremely difficult and occasionally impossible. The removal of the pericardium without removal of the thickened epicardium would be much less difficult, and, as a rule, less dangerous, but the epicardium is usually so greatly thickened that little benefit could be expected if this were left intact. It is, therefore, necessary to remove both the thickened pericard-

ium and epicardium to permit a satisfactory diastole."

In the long-standing cases the fibrous strands are apt to dip in between the cardiac muscle fibers and make the dissection difficult. Most authorities advise combined sharp and blunt dissection with removal of small fragments of pericardium as they are freed. It would seem less dangerous to use sharp dissection almost entirely, and it is especially important to keep the operative field under direct vision throughout the dissection. In one of the cases here reported this was not done, and there was a rupture of the wall of the right ventricle. In all probability this would not have occurred if the operative field had been fully visible at the time, as the separation of the muscle fibers would have been noticed.

"It would seem advisable to leave the pericardium in place during the early portion of the dissection, so that if the chamber of the heart were entered, the pericardium could be used to help close the opening and control the hemorrhage. This is important when the cardiac muscle is atrophic and friable, as sutures would almost certainly cut through."

"Schmieden, Cutler and others feel that it is important to remove the pericardium over the left ventricle first, since they fear a dilatation of the weakened right ventricle if the support is removed from the anterior surface of the heart before the left ventricle is released. This seems a logical assumption, and yet in Churchill's case and in case 2 reported here, the greater portion of the dissection was carried out over the right ventricle, and in neither case was there serious difficulty as the result of this."

"Churchill, in 1929, tabulated the results in 37 cases he was able to collect

from the literature Five cases were interrupted Of those completed, there was an operative mortality of 21·8 per cent, no improvement in 6·2 per cent, transient improvement in 12 per cent, and almost complete relief from symptoms in 59 per cent" If a satisfactory two-stage operation can be developed, the incidence of postoperative dilatation of the heart should be decreased

PERICARDITIS WITH EFFUSION.—In a study of 113 cases of pericarditis with effusion in which necropsy was performed, Smith and Willius (*Ibid*, p 192) found that *infections* were the *etiologic factors* in 111 cases (98·2 per cent) Seventy-seven cases (68·1 per cent) were classified as acute purulent pericarditis, 30 cases (26·5 per cent) as fibrinous pericarditis with effusion, 3 cases (2·7 per cent) as tuberculous pericarditis, and 3 cases (2·7 per cent) as noninflammatory effusion Seventy-eight (69 per cent) of the cases occurred in males Intrathoracic infectious disease occurred with the greatest frequency, infectious disease elsewhere in the body occurred in 31 cases (27·4 per cent) Infection was absent in only 2 cases, both being examples of primary cardiac disease with congestive failure The high incidence of *pleural effusion* occurring with these forms of pericarditis is of interest Fluid was present in one or both pleural cavities in 83 cases (73·5 per cent) From this study, therefore, it appears to be established that, as has been held by other observers, the presence of infectious intrathoracic disease offers a great chance for involvement of the pericardium, and that the chance of pericarditis is still greater in the presence of infectious processes of the body as a whole In view of this fact, the presence of infections should

always cause attention to be focused on the pericardium

Associated disease of the heart occurred relatively infrequently in these cases of pericarditis with effusion In 33 cases (29·2 per cent) there was associated cardiac disease, which may be compared with the 53·5 per cent incidence among the cases of adherent pericarditis studied by the same authors Complaints predominantly referable to the cardiovascular system occurred in only 13·2 per cent of the cases In the majority, the clinical syndrome was that of sepsis Deaths resulting directly and solely from heart disease occurred in only 8·8 per cent of the cases, from sepsis in 77·9 per cent, and from other causes in 13·3 per cent Smith and Willius point out that the value of so-called characteristic signs of pericardial effusion is considerable and that the presence of any such sign should be properly evaluated, but that their absence does not justify failure of recognition of the condition

Treatment—G W Thomas (*Am Heart J* 7 771 (Aug) 1932) reports a case of *tuberculous pericarditis with effusion* treated by means of *pneumopericardium*. The procedure did not cure the patient, nor even prevent the necessity for cardiolysis later, however, this may have been because the treatment was not continued for a sufficiently long period

The patient was a Portuguese boy, 18 years of age Two hundred and fifty c c of oxygen were injected the first time, after the removal of 375 c c of fluid by the subxiphoid route, 3 days later 740 c c more of fluid were removed and replaced by 590 c c of air, and 2 days thereafter another 740 c c of fluid were replaced by 560 c c of air One day later marked respiratory dis-

tress, cough and abdominal pain necessitated the withdrawal of 175 c c of air, which was followed by definite subjective relief. Six weeks later, 320 c c of fluid were removed from the fifth intercostal space on the right, and 250 c c of air were injected, which procedure was followed by a chill and fever. Five months thereafter, in view of persistent engorgement of the liver and ascites, cardiolysis was performed, and 10 weeks later the patient's general condition had improved to the extent that he was discharged to a sanatorium for general care, where he gradually increased his activities and was up and about for short periods daily.

Thomas feels that it is impossible to estimate the therapeutic value of artificial pneumopericardium from this case and the few reported in the literature. In the latter, without exception, all the authors felt that the procedure gave symptomatic relief and slowed up the reaccumulation of fluid. Of the 16 patients with tuberculous pericarditis treated in this manner, 9 died while under observation, but in only 1 instance did death seem related to the procedure. This patient died 8 hours after the air injection. Most of the others died of tuberculosis elsewhere in the body, usually pulmonary, after the pericardial symptoms had been largely or partially relieved. The 7 patients who did not die under observation were not followed sufficiently long to permit the drawing of definite conclusions, but several of them recovered sufficiently to resume partial activity. He concludes by stating that it would seem preferable, on theoretical grounds, to keep the parietal and visceral pericardium apart by means of elastic gas rather than by inelastic fluid, to prevent the formation of pericardial adhesions in pericarditis, and,

therefore, artificial pneumopericardium deserves more extensive trial than it has yet been accorded.

PYOPERICARDITIS.—Treatment—The problems of acute pericarditis and chronic adhesive pericarditis differ in every way. The approach suggested by Shipley, giving free access through the "triangle of safety" and reducing the danger of pleural damage has been noted. J. D. Biogard (Am J Surg 17 1 (July) 1932) analyzes a total of 171 cases of pyopericarditis treated by pericardiotomy reported up to May, 1931, with 77 early deaths (45 per cent mortality and 94 recoveries).

The various methods of approach are recorded and methods used to secure drainage discussed. Once adequate drainage has been established, according to Biogard, its maintenance must be assured until the pericardial sac has become relatively sterile. Considerable variance in the methods used to gain this end and controversial opinions appear in the literature. Shipley, who enjoys a wider experience with pericardiotomy (11 cases) than any other surgeon, advocates open drainage through a transternal approach in children, and a xiphocostal approach in adults with the insertion of Dakin's tubes into the most dependent portion of the pericardial sac. He stresses the necessity of exploring the entire confines of the pericardium with the finger, to open up any walled-off abscess. Airtight closed drainage, with frequent irrigation with saline or Dakin's solutions, through an indwelling catheter, has been used by Harloe and Bowers. Negative pressure drainage has been employed by Whittemore. Various forms of rubber tubing and gauze packs have been used. Equally effective drainage

has been accomplished without the insertion of any foreign body but merely by suturing the pericardium to the skin or subcutaneous tissue. Peterson secured dependent drainage by means of posture, *i e*, turning the patient on his face periodically.

The observations made by Beck and Cox, according to Biogard, suggest that definite physiologic advantages are to be gained by the air-tight method of drainage. Experimentally, they demonstrated that cardiac efficiency was considerably reduced by tamponage when exposed to atmospheric pressure. Metnet, Harrigan and Ljunggren report cases in which the heart ceased beating simultaneously with the opening of the pericardium, the "stand-still heart." Return of function was attributed to massage, mechanical stimulation, and in 1 case, to the injection of ephedrin.

[The high incidence of success in the experimental production of extensive "strangulating" adhesive pericarditis by the injection of Dakin's solution into the normal pericardial sacs of dogs, as reported by C S Beck (*J A M A* 97: 824 (Sept 19) 1931) makes one hesitate to use this same solution as an irrigating and antiseptic solution, although Shipley (*loc. cit*) says "Of the 6 patients on whom I have operated for pyopericardium and who have recovered, I have kept track of 5 and no one of the 5 is disabled. Several had a slow recovery and one boy had anasarca and ascites with shortness of breath for several months, but now, after 5 years, is apparently well." It is possible that, because of the inflammatory products, the contact between the Dakin's solution and the pericardial endothelium is not so intimate, and because of dilution the chemical activity not so intense, thus

determining a clinical result at variance with the experimental.—Ed.]

CARDIOVASCULAR SYPHILIS—SYPHILITIC AORTITIS.

—*Diagnosis.*—In the comparison of clinical and necropsy observations in 105 patients with uncomplicated syphilitic aortitis (without aortic regurgitation or aneurism) in the Johns Hopkins Hospital, J E Moore, J H Dangle and J C Reisinger (*Arch Int Med* 49: 753 (May) 1932) found that the early diagnosis of this condition is of fundamental importance for the treatment of cardiovascular syphilis. As previously pointed out by J E Moore and J H Dangle when the aortic valves have been so distorted as to produce incompetency, or when the wall of the aorta has weakened to the point of producing saccular dilatation, the utmost to be expected of treatment is some degree of symptomatic relief and the possible prolongation of life to more than the usual span of about 2 years from the appearance of symptoms. If, however, involvement of the aorta can be recognized before these pathological changes have occurred and if appropriate treatment is instituted, it is reasonable to hope for symptomatic relief in a higher proportion of cases and prolongation of useful life for a much longer period of time.

The clinical diagnosis of syphilitic aortitis was made correctly during life in 4 of the 105 patients; in 13 more it was suspected that something was wrong with the aorta, and in 35 additional patients the diagnosis might have been correctly made on the basis of the symptoms and physical signs recorded. In 12 cases, the diagnosis was obscured by some other form of cardiovascular disease, and 34 patients died with hearts and aortas thought clinically to be nor-

mal Syphilis was infrequently a major feature of the fatal illness, and when it was, aortitis was more often diagnosed correctly than when it was unrelated to syphilis. The blood Wassermann reaction was positive in 75 per cent of the cases, and negative in 25 per cent. Hypertension was an infrequent accompaniment and, in spite of the confusion it created in the individual case, its presence did not prevent correct diagnoses.

Symptoms and signs permitting a diagnosis were present in about half of the cases who showed only slight gross pathologic change at necropsy. According to the authors, in order of relative importance, the diagnostic criteria of uncomplicated syphilitic aortitis are, as follows: (1) teleroentgenographic and fluoroscopic evidence of aortic dilatation; (2) increased retromanubrial dullness, (3) history of circulatory embarrassment, (4) a tympanitic, bell-like, tambour accentuation of the aortic second sound, (5) progressive cardiac failure, (6) substernal pain, and (7) paroxysmal dyspnea. In patients with proved late syphilis, the presence of any 3 of these 7 criteria is considered justification for the diagnosis of uncomplicated syphilitic aortitis.

SYPHILITIC MYOCARDITIS.

—While some authors believe that syphilitic myocarditis is often encountered in the later stages of syphilis, others believe that the condition is rare. O Saphir (*Arch Path* 13:266 (Feb), 436 (Mar) 1932) has presented an extensive critical review of the literature of syphilitic myocarditis, and the results of a study of the myocardium of 130 cases of syphilitic aortitis with insufficiency of the aortic valve. The age of the patients varied from 23 to 65 years, the majority being about 40

years of age. None of the cases showed gummas in the myocardium. In 41 cases the mouths of the coronary arteries showed constriction. In 11 cases the constriction was confined to the orifice of the right, and in 10 to that of the left, coronary artery. In 20 cases the mouths of both coronary arteries were encroached upon. In 4 cases there was complete obliteration of the mouth of the left coronary artery, and in only 1 case was there complete obliteration of the right. The coronary vessels themselves showed a varying amount of arteriosclerosis, *i.e.*, simple intimal thickening, hyalinization and calcification, but there was no gross evidence of syphilis seen throughout their course. All of the hearts were hypertrophic, which fact is easily understood, since the study included only those hearts that showed, in addition to aortitis, insufficiency of the aortic valve. Microscopic examination of the myocardium revealed no morphologic changes that could be interpreted as syphilitic myocarditis. All the changes, such as perivascular infiltration of lymphocytes, and the presence of lymphocytes, plasma cells and endothelial cells in the interstitial tissue, might be encountered in other conditions, being interpreted as the result of coronary sclerosis or as following narrowing of the coronary orifices.

In none of the sections of the myocardium of the 130 hearts did the Levaditi or the Warthin-Starry stain reveal typical spirochetes. With every section of the myocardium stained for spirochetes, tissue from a case of congenital syphilis was stained simultaneously as a control. After the failure to demonstrate spirochetes, coverslips prepared according to the Warthin-Starry method were examined, without

the tissue and artefacts that resembled spirochetes were found in a certain number. Similar artefacts were also produced by the use of the Levaditi stain, but much less frequently.

TREATMENT OF CARDIOVASCULAR SYPHILIS.—Analysis of the results obtained in 53 patients with aortic aneurism and in 112 with aortic regurgitation has led J. E. Moore, J. H. Danglade and J. C. Reisinger (*Arch Int Med* 49 879 (June) 1932) to conclude that properly supervised antisyphilitic treatment, with adequate general medical care, prolongs life, alleviates symptoms, maintains the ability to pursue a gainful occupation and reduces the incapacity.

Of 6420 patients from the Johns Hopkins Hospital Clinic with various forms of late syphilis, 10 per cent had cardiovascular syphilis, and of the total number 27 per cent had aortic regurgitation and 12 per cent aortic aneurism on clinical examination. Cardiovascular syphilis was found to be twice as common in males as in females, and about twice as common in negro as in white patients. According to pathologic studies carried out by various investigators, from 70 to 90 per cent of all patients with late syphilis show postmortem evidence of syphilis of the aorta. The majority of cases of aneurism and aortic regurgitation occur in the fifth decade of life, white patients appear to be affected later in life than negroes, and males later than females. About one-half of all patients with cardiovascular syphilis can give no history of infection with the disease, therefore, symptomless infection must be a fairly frequent occurrence. The average interval of time between infection and the development of cardiovascular symptoms is about 20 years.

In 20 of their 165 patients, the aneurism or the aortic regurgitation caused no symptoms, having been accidentally discovered during routine physical examination. The onset of symptoms was usually abrupt, but at times was slow and insidious. All except 13 of the patients in the series had been subjected to the strain of hard physical labor. The most frequent association with other lesions of syphilis was that with syphilis of the central nervous system (especially tabes dorsalis), which occurred in from 17 to 18 per cent of the series. However, the actual incidence of complicating neurosyphilis was about 35 per cent, in that an additional 17 per cent of patients had abnormal spinal fluids without clinical evidence of neurosyphilis. Positive blood Wassermann reactions were obtained in 98 per cent of the patients with aneurism, and in 96 per cent of those with aortic regurgitation.

One hundred and forty-seven (89 per cent) of their patients had never received any treatment for syphilis before the development of cardiovascular syphilis. Of the remainder, not one had received adequate treatment for early syphilis. Only 4 of 165 patients had received arsphenamine at the time of early syphilis, and none of these got more than 3 injections. In an earlier study of the outcome of treatment in early syphilis in their clinic, not one of 117 with early syphilis who received 3 or more courses of arsphenamine, and treatment with mercury between the courses, presented any evidence of cardiovascular involvement during the period of observation, while 24 of 285 who had received less than this amount of treatment acquired syphilitic aortitis, aneurism or aortic regurgitation. These data constitute a powerful argument for

the adequate treatment of early syphilis, and also indicate that modern antisyphilitic treatment is probably not responsible for the apparent increase in the incidence of syphilitic aortitis

In outlining the evolution of the modern method of treatment, stress is laid on *sudden death during* or immediately following the *administration of arsphenamine* to patients with syphilitic heart disease, presumably due to ventricular fibrillation, on sudden death from 24 to 48 hours following an injection, due to therapeutic shock (the Jarisch-Herxheimer reaction), and on the therapeutic paradox. Avoidance of these reactions calls for adequate general medical care and the cautious use of mercury, the iodides, neoarsphenamine and bismarsen in small doses. All reactions to treatment should be meticulously avoided, and treatment should be prolonged over a period of years. With this method of treatment and subdividing the patients into 4 groups, on the basis of the amount of treatment given, the authors found that in 22 patients with aortic aneurism, who received little or no treatment, the mortality during the period of observation was 90 per cent, and that the average duration of life from the onset of symptoms to death or, in living patients, to the last observation, was 19 months. In 15 well-treated patients with aortic aneurism, the mortality was 40 per cent., and the average duration of life 75 months. In 57 patients with aortic regurgitation who received little or no treatment, the mortality was 91 per cent and the average duration of life 30 months, while in 25 well-treated patients, the mortality was 16 per cent and the average duration of life 71 months.

The occurrence of *congestive heart failure before* the institution of treat-

ment was found to be of *unfavorable prognostic import*. In the entire series, 21 per cent of those still living had heart failure before treatment, while it had occurred in 51 per cent of those now dead. Of 67 patients who had or had had cardiac failure when treatment was started, 12 are now living and 55 are dead, a mortality of 81 per cent. The average duration of life for the 12 survivors is 54 months, for the 55 who died, 24 months. Of the 96 who had not lost cardiac compensation before treatment, 44 are living, with an average duration of life of 69 months, and 52 are dead (56 per cent mortality), with an average duration of life of 30 months. It appears, therefore, that the appearance of cardiac failure before treatment is started shortens life, on the average, from 6 to 15 months. Less importance is attached to the occurrence of attacks of congestive failure during or after treatment, however, it was observed in only 33 per cent of those still living as contrasted with 69 per cent of those now dead. To some extent, at least, congestive failure occurring before treatment is started does predispose to subsequent similar attacks.

Symptomatic relief in cardiovascular syphilis is probably in direct proportion to the amount of treatment given, and complete incapacity is much less frequent and of shorter duration in well-treated than in poorly treated patients. In this series, 21 of the surviving 56 patients are symptom-free and able to work, 26 have some persistent symptoms, but can carry on at light work, and 9 are incapacitated. Twenty-eight of the 47 still able to work were well treated for syphilis. Fifty-seven of the 165 patients died of progressive cardiac failure, 28 (10 with aneurism, and 18 with aortic regurgitation) died sud-

denly, 11 died, but the cause of death was unknown, and 13 died of some cause other than cardiovascular syphilis.

Attention is called to the fact that a *fixed positive blood Wassermann is the rule in cardiovascular syphilis*, and that the *response of this reaction to treatment may be completely disregarded*. In their experience, the arsenical drugs of choice are, in order, neoarsphenamine, bismarsen and silver arsphenamine. Old arsphenamine (606) should not be employed in patients with aneurism or aortic regurgitation, and the use of tryparsamide should be limited to patients with complicating *neurosyphilis*.

THYROID HEART DISEASE.

—The eighth annual scientific session of the American Heart Association, held in New Orleans, May 10, 1932, consisted of a *Symposium on the Thyroid Heart*. In the words of the Chairman of the Committee for the Coordination of Investigation "It was hoped to present a fairly complete picture of the cardiac disturbances, both physiological and pathological, which result from an abnormal functioning of the thyroid gland," and "to focus attention upon those points which were in dispute and especially upon those which seemed most ready for solution.

First, the coincident presence of arteriosclerosis of the coronary arteries has been a great source of confusion, and it seems that changes due to this have often been wrongly considered as an effect of thyroid disease. Second, auricular fibrillation, from its tendency to produce a rapid heart rate, can give rise to cardiac insufficiency and this, in turn, to cardiac enlargement of myocardial fibrosis or possibly other changes.

"Obviously, if such abnormalities result from heart failure they cannot properly be considered as an effect of

thyroid dysfunction upon the heart. It has been suggested that the prolonged cardiac overactivity which is known to result from hyperthyroidism might give rise to premature coronary arteriosclerosis, and it was hoped that we might be able to reach a decision as to whether or not such premature sclerosis occurs.

There has been no doubt but that thyroid disturbances lead to disturbances of cardiac function.

Auricular fibrillation, if permanent and associated with a rapid ventricular rate, is quite capable of causing serious cardiac insufficiency. The arteriosclerotic changes which appear normally after the fourth decade can also give rise to cardiac insufficiency.

"It is difficult in a patient who has either of these complicating conditions clearly to discern the influence of thyroid dysfunction upon the heart.

On the experimental side there is much to be learned about the effects upon the heart's function and structure produced by the administration of thyroxin and of thyroid gland. The heart after thyroidectomy has been little studied, either as to functional or structural changes. Finally, the question of the influence of a simple nontoxic adenoma should be settled. Does this condition cause physiological and pathological changes in the heart such as have been associated with under- or overactivity of the thyroid, or does it not?"

The following papers comprised the program.

HYPERTHYROIDISM. — *Circulation* — In a study of the mechanism of adjustment of the circulation in hyperthyroidism, W. M. Yater (*Am Heart J* 8 1 (Oct) 1932) points out that the increase in the rate of the circulation in thyrotoxicosis is due mainly to the increase of thyroxin in the myo-

cardium which causes the heart to beat more rapidly and more vigorously J K Lewis and D McEachern (Proc Soc Exper Biol and Med 28 504 (Feb) 1931), and also J T Priestly, J Markowitz and F C Mann (Am J Physiol 98 357 (Sept) 1931), have shown that the isolated hearts of thyroxinized rabbits persist beating at an accelerated rate The latter group of workers also demonstrated that the heart of a pup, anastomosed to the vessels of the neck of a large dog, beat much faster when the large dog was thyroxinized In a large series of rabbits made acutely hyperthyroid by intravenous injection of thyroxin, W M Yater (Am J Physiol 98 338 (Sept) 1931) found that the isolated perfused hearts beat much faster for many hours than the hearts of rabbits not thyroxinized

The average rate of the perfused hearts of normal rabbits was 140 per minute, and that of the acutely thyroxinized rabbits was 193 per minute, an increase of 38 per cent After excision of the sinoauricular node of the perfused thyroxinized hearts, the heart rate was still greatly increased when compared with controls, and after producing auriculoventricular dissociation by crushing the bundle of His, the ventricles usually continued to beat at an accelerated rate After completely denervating the hearts of dogs, M McIntyre (Am J Physiol 99 261 (Dec) 1931) found that the hearts of animals made hyperthyroid beat faster to the same degree as in control dogs Finally, C Markowitz and W M Yater (Am J Physiol. 100 162 (Mar) 1932) have shown conclusively that thyroxin acts directly upon the muscle fibers In a study of the action of thyroxin on tissue cultures of pulsating fragments of heart muscle removed from chick em-

bryos before the appearance of nerve elements in the heart, there was found to be effected thereby a progressively greater increase in the rate of pulsation, ending in fibrillation and paralysis in some cases

Associated with the increase in the rate of the circulation are a general vascular relaxation brought about by the local action of metabolites on the arterioles and capillaries, and an increase in the circulating blood volume According to L Wislicki (Ztschr f d ges exper Med 71 696, 1930), and H C Chang (J Clin Investigation 10 475 (Aug) 1931), the increase in blood volume involves the plasma and the cellular elements proportionately, and may be as great as 30 per cent It is due mainly, perhaps, to contraction of the spleen, as in exercise The increase in blood volume augments the effect of vascular relaxation and allows the filling of the heart to be adequate in spite of the larger size of the stream-bed In hyperthyroidism there is probably also an increase in the rate and the depth of respiration, the result of the effect of an increased hydrogen ion concentration on the respiratory center, which factors aid in the more rapid return of blood to the heart

Yater concludes that since the acceleration of the heart rate and the increased vigor of the heart beat are due entirely to the effect of thyroxin upon the heart muscle, it is, therefore, entirely a coincidence that there exists in hyperthyroidism an increased blood flow and velocity of the circulation Were it not for this fact, patients with hyperthyroidism would soon suffer from relative tissue anoxemia and the metabolic rate would be decreased

Cardiac Histopathology—In a preliminary report on cardiac histopathol-

ogy in thyroid disease by C V Weller, R C Wanstrom, H Gordon and J C Bugher (Am Heart J 8 8 (Oct) 1932), there was found in the hearts of 35 patients with *exophthalmic goiter*, with but few exceptions, no gross or microscopical pathological changes not equally represented in a carefully matched control series. No cases showing any evidence of syphilis, rheumatic fever, infective endocarditis, or severe coronary atherosclerosis were included in the study, on the basis that myocardial changes are exceedingly common in these diseases. In the *exophthalmic goiter* group, the exceptions found consisted of (1) a relatively higher incidence of myocardial fibrosis, endocardial sclerosis, and cellular infiltrations, and (2) in 1 case an active focal myocarditis for which no etiological factor could be ascertained other than the hyperthyroid state. Twenty-eight (80 per cent) of the *exophthalmic goiter* group showed areas of myocardial fibrosis, as compared with 51.5 per cent of the control series. Study of the hearts of 55 cases of *adenomatous (nodular) goiter* failed to reveal any significant difference in the incidence of pathological changes as compared to a nongoitrous control series.

After a study of 27 autopsy cases of *hyperthyroidism*, and experimental work on rabbits and guinea-pigs rendered hyperthyroid by intramuscular injections of thyroxin, G Rake and D McEachern (*Ibid* p 19) conclude that hyperthyroidism by itself produces no specific lesions in the myocardium. It is conceivable that damage produced either by physiological wear and tear or by an associated infection or other disease tends to be more accentuated in a patient with hyperthyroidism than in a normal individual. They feel that in

the past too much emphasis has been laid upon the morphological changes in the myocardium, with consequent neglect of important alterations in the metabolism and function of the muscle fibers. In this connection, attention is called to the fact that no glycogen can be found microscopically or by analysis in the myocardium when hyperthyroidism is produced experimentally, and that the withdrawal of glycogen from cells normally well supplied with it renders them more liable to injury, to which they react with diminished function and actual structural change and death. This problem has been well examined in the case of the liver, and it may well be believed that similar reasoning may be applied to the myocardium.

In an experimental study with rabbits, in which *hyperthyroidism* had been produced by using (1) thyroxin, (2) Armour's desiccated thyroid, and (3) desiccated human thyroid (from patients with *exophthalmic goiter*) for a period of 23 days, parenchymatous and fatty degeneration, histiocyte invasion, fraying of the muscle bundles and early fibrosis were found in the hearts by F R Menne, R H Keane, R T Henry and N W Jones (*Ibid* p 75). In an effort to determine whether or not similar changes might be produced by cardiac overwork, irrespective of the presence of an excess of thyroxin in the circulation, these investigators cut the depressor nerves and denuded the carotid sinuses of their investments, but, only 1 of the rabbits survived the operation sufficiently long (6 days) to permit of cardiac damage. In this case, however, the changes were extremely marked and of the same type observed in the thyrotoxic animals. They intend to proceed with this phase of the problem, believing that a heart which is induced to

work more rapidly, with an increased volume output in the presence of increased pressure and metabolism (as is true in hyperthyroidism), may exhaust its nutrition and respond with morbid anatomical changes that may be erroneously ascribed to the pernicious effect of thyroxin on the myocardium

Symptoms and Signs of Heart Changes—In a review of 148 cases of *toxic goiter* from the standpoint of signs and symptoms of heart involvement, made by C T Burnett and E Durbin (*Ibid* p 29), *dyspnea* on exertion was the most frequently noted symptom, being present in 56 per cent of the cases, *palpitation* was present in 53 per cent, *tachycardia* was complained of, in addition to some other symptom usually accepted as indicative of heart disease, in 32 per cent, 25 per cent presented *swelling of the feet or ankles*, 12 per cent *precordial or substernal pain*, 7 per cent *dizziness*, 3 per cent *heart consciousness*, and 3 per cent *cardiac irregularity*. On examination, *tachycardia* was found more than twice as frequently as complained of. A normal *pulse rate* (70-90) was present in 16 per cent, and 1 patient had a pulse rate below 70 per minute. *Enlargement of the heart* was found in 30 per cent, with an average age of 41.18 years. Forty per cent of the entire group had a *systolic murmur* at the apex. *Auricular fibrillation* was present in 12 per cent, *auricular flutter* in 2 per cent, and *premature contractions* in 5 per cent of the cases. Signs of *decompensation* occurred in 13 per cent.

In view of the fact that 71 per cent of the cases showed some sign of heart disturbance exclusive of tachycardia, the authors conclude that at least temporary heart damage is present in approximately two-thirds of the cases of

toxic goiter during the toxic stage. Their study does not, however, prove whether or not the heart is permanently damaged in the average case.

In a study of the *heart rates* with the cardiometer, E P Boas (*Ibid*, p 24) found in Graves's disease little reduction of the rate during sleep, the minimum sleeping rate being on the average over 30 beats higher than that of normal individuals, while in neurogenic sinus tachycardia the heart rate showed a marked reduction during sleep, though not quite attaining the low level observed in normal individuals. The measurement of the heart rate during sleep is, therefore, of diagnostic value in distinguishing thyrotoxic from neurogenic tachycardias, and also may serve as a rough check on the reliability of the basal metabolism determination.

An analysis of 184 patients with hyperthyroidism by J Lerman and J. H Means (*Ibid*, p 55) shows that cardiac symptoms are more common, more severe and of longer duration in the female. Cardiovascular disease occurs to the same degree in female and male patients, but cardiac enlargement, precordial thrill and a superficial pericardial friction rub* are more common in the female, whereas auricular fibrillation and other forms of arrhythmia are more common in the male. Also, the pulse rate tends to be slower in the male.

* In the moderate and severe cases of hyperthyroidism, the authors have noted a rough, grating systolic murmur, with some of the characteristics of a friction rub, heard best over the sternum in the region of the second interspace. It is superficial, heard best at the end of full expiration and obscured by full inspiration. Its intensity subsides as the metabolism and heart rate drop under the influence of iodine, and usually disappears after operation. Its causation is not definitely known, but it is believed to be pleuropericardial in origin and may have some relationship to the dilated pulmonary conus often present in this condition. As mentioned by Lerman and Means, it has been described previously in the literature by other observers.

than in the female, while the pulse pressure is higher. Since the pulse pressure is roughly an indication of the output of the heart per beat, it may be inferred that the volume flow of blood is the same in the groups.

The severity of the cardiac complaints was greater in the hyperthyroid patients than in a control group of 233 cases of nontoxic nodular goiter. Thirty of the latter group presented definite cardiac disease, which was of the hypertensive or arteriosclerotic type in 20 instances, auricular fibrillation in 1, paroxysmal tachycardia in 2, and angina in 1. Whereas, in the toxic group, there were 24 cases of definite cardiac disease, of which 3 were of rheumatic origin, 5 were of the arteriosclerotic or hypertensive type, and in 16 there was either auricular fibrillation, angina or congestive failure, singly or in combination. It seems, therefore, that in the hyperthyroid group cardiovascular damage consists chiefly of a functional disturbance rather than a structural change. Furthermore, the fact that almost all patients with cardiac disease were older than the hyperthyroid patients without cardiac disease, and the high incidence of peripheral arteriosclerosis, suggest that hyperthyroidism *per se* is not responsible for the so-called thyroid heart disease, but merely produces functional disturbance in a previously damaged cardiovascular system. This surmise is supported by the fact that patients with hyperthyroidism for 10 years or more are often seen without any evidence of cardiac damage. Occasionally, however, cardiac failure does develop in a young individual with thyrotoxicosis without evidence of a previously damaged heart.

E. C. Andrus (*Ibid.*, p. 66) reports the incidence of *congestive heart failure* in 18.5 per cent of 200 cases of hyper-

thyroidism followed in the Johns Hopkins Hospital. All the cases were subjected to subtotal thyroidectomy, and, according to the pathologist's report upon the portion of gland removed, 158 belonged to the exophthalmic group and 42 to the toxic adenomatous group. Among the former, 23 (14.55 per cent) showed signs of congestive failure upon entering the hospital, while 14 (33 $\frac{1}{3}$ per cent) of the latter group had myocardial insufficiency. The average duration of symptoms of hyperthyroidism among the cases of exophthalmic goiter was 12.6 months. In those without cardiac failure it was 11 months, while in those with failure the average duration of symptoms was 21 months. In the *toxic adenomatous group*, there was usually a history of symptoms of hyperthyroidism for many months, often of goiter for years, and not infrequently a story of one or more previous attacks. Among these the average duration of symptoms was greater than in the first group, *viz.*, 22.4 months for all cases, 28 months for cases with failure, and 16 months for cases without failure. The incidence of myocardial insufficiency increased in the age-decades above 40, and was most common in any age-group in association with other preexistent factors which tend to diminish the cardiac reserve, such as rheumatic heart disease, hypertension, arteriosclerosis or, more rarely, syphilitic heart disease.

Andrus calls attention to the fact that the administration of *thyroxine* to an animal (rabbit or guinea-pig) so alters the metabolism of the myocardium that (1) the heart beats at a faster rate for hours after isolation, as demonstrated by D. McEachern, E. C. Andrus and by J. K. Lewis, (2) the oxygen consumption of the heart is increased, as shown by D. McEachern, E. C. Andrus,

W Dock and J K Lewis, and (3) the glycogen content of the cardiac muscle is diminished, as shown by J P Hoet and H P Marks, and in certain instances the lactic acid content is increased

Andrus concludes that *myocardial insufficiency* may supervene in hyperthyroidism when the load thrown upon the heart exceeds or approaches the limits set by its metabolism. In any given case of hyperthyroidism, the ultimate effect of the increased circulatory demands and the augmentation of metabolism of the myocardial tissue may be determined by the soil upon which they are implanted, and in individuals whose circulatory reserve has been diminished by age or organic heart disease, myocardial insufficiency may result

In an effort to determine the amount of *cardiac damage* produced by hyperthyroidism, J M Read (*Ibid* p 84) studied 20 patients known to have been thyrotoxic for 6 months to 11 years. Only 1 of the patients was a cardiac cripple, and in that case evidence of *circulatory failure* antedated by 4 years the onset of thyrotoxicosis. Two other patients, aged 50 and 55 years respectively, had *hypertension*, which could not be ascribed to their thyroid disease. There was no correlation between the duration (or intensity) of thyrotoxicosis and the severity of cardiac manifestations

Read calls attention to the fact that palpitation, tachycardia and arrhythmia cannot be accepted as certain evidence of cardiovascular disease. Neither is there anything about the hypertension, which is found only in older patients, that distinguishes it from ordinary hypertensive cardiovascular disease found alone or coincidental with other pathological states. *Auricular fibrillation*

which occasionally supervenes in thyrotoxicosis is a definite sign of functional abnormality. However, it scarcely ever occurs in patients under 30 years of age, and is often merely paroxysmal, disappearing with subsidence of the underlying thyrotoxicosis. *Congestive failure*, which occurs in a small number of thyrotoxic patients, usually with auricular fibrillation, does constitute definite evidence of myocardial insufficiency, but it does not necessarily imply structural myocardial change, for it may supervene in a heart which is temporarily functionally insufficient but organically sound

The author concludes that when cardiac failure occurs in the course of thyrotoxicosis, it is a temporary functional insufficiency resulting from overwork (prolonged tachycardia, increased blood flow, etc.), since there remains no evidence of permanent organic damage and because there is no characteristic pathological lesion. Further evidence in support of this view is that thyroid-cardiac disease is seldom, if ever, found in young people, but only in individuals in the later decades of life whose cardiac reserve has been already encroached upon by degenerative cardiovascular changes. Whether or not a thyrotoxic patient develops cardiac disease depends, therefore, more upon the integrity of his cardiovascular system than upon the intensity or duration of the thyrotoxicosis

Cardiac Hypertrophy and Congestive Heart Failure.—In a study of 178 fatal cases of hyperthyroidism (110 cases of exophthalmic goiter and 68 cases of hyperfunctioning adenomatous goiter) at The Mayo Clinic, made by E J Kepler and A R Barnes (*Ibid* p 102), there were 89 without evidence of hypertension or complicating disease

of the heart. Of the latter number, the weight of the heart in 49 per cent exceeded H. L. Smith's maximal standard values calculated on the basis of the patient's weight prior to illness. In a given case of hyperthyroidism, the weight of the heart at death depends on several factors, among which are (1) the weight of the heart prior to the onset of hyperthyroidism, (2) the age of the patient, (3) the duration of hyperthyroidism, (4) the degree of malnutrition with its tendency to decrease the weight of the heart, and (5) the amount of excess work placed on the heart as the result of the hyperthyroidism. If the actual weight of the patient at the time of death was used as a basis for comparing the weight of the heart to the standard, it was found that in practically all instances the weight of the heart exceeded Smith's maximal values.

Severe congestive failure occurred in 27 (15 per cent) of the 178 cases. In 18 (67 per cent) of these 27 cases, coronary sclerosis, hypertension, acute or chronic pericarditis, rheumatic endocarditis or syphilis was present, and in the remaining 9 cases no cause for the congestive failure other than hyperthyroidism could be found. Auricular fibrillation occurred with increasing frequency in each decade in the 178 cases, and either auricular fibrillation or auricular flutter was present in practically all the cases of congestive heart failure. Only 2 patients aged less than 35 years suffered congestive failure. One of them had hypertension and nephritis; and in the other case, a male, aged 32 years, no other cause for failure than hyperthyroidism could be found. The weight of the heart of 4 patients with congestive failure was less than 300 Gm, and of 1 patient, a female

aged 43 years, who had exophthalmic goiter for 17 months, it was only 205 Gm.

Angina Pectoris and Hyperthyroidism—In calling attention to the association of angina pectoris and hyperthyroidism, M. W. Lev and W. W. Hamburger (*Ibid* p 109) express the opinion that when this combination occurs, the heart already is the seat of some vascular or myocardial change (such as coronary sclerosis with or without occlusion, myocardial fibrosis, aortitis, etc), and that the added burden upon the heart, due to the increased body metabolism, results in the heart not being able to meet still further sudden demands, and cardiac pain results. In young hyperthyroid individuals, with the myocardium and vascular supply intact, the heart is able to meet increased demands, and no pain results. The authors believe that thyroidectomy is not contraindicated in the presence of angina pectoris, and have found the anginal symptoms to be relieved in the majority of cases by the administration of iodine and thyroidectomy.

Influence on the Electrocardiogram—In an effort to determine any specificity of any changes in the T waves of the electrocardiogram during thyrotoxicosis, J. McGuire and M. Foulger (*Ibid* p 114) examined the records in 222 cases of hyperthyroidism. After eliminating such extrinsic factors as digitalis, iodine therapy, and complicating heart disease, which are apt to alter the T wave, there remained but 16 records. In 4 of these, T waves of unusually high voltage and rolling contour ("thyroid T waves") were found. These changes were not dependent upon the pulse rate, since they did not occur in sinus tachycardia, nor were they dependent upon increased basal metabolic

rate, nor specific for thyrotoxicosis, since quite similar waves were found in some cases of neurocirculatory asthenia with a pulse rate of 90 or less. The administration of thyroid extract to normal individuals was found to produce comparable alterations in the electrocardiogram, and also the administration of large doses to dogs caused tachycardia and increase in the voltage of the T waves. Removal of the stellate ganglia in 1 dog experiment did not prevent the development of tachycardia under thyroid medication, but "thyroid T waves" did not appear. Since a high pulse pressure is common in thyrotoxicosis and is not infrequent in neurocirculatory asthenia, the authors are investigating its relationship to the amplitude of the T waves.

AURICULAR FIBRILLATION IN GRAVES'S DISEASE.—In a study of 108 cases of auricular fibrillation in Graves's disease by P S Barker, A L Bohning and F N Wilson (*Ibid* p 121), the average age of the patients was 51.5 years, the average basal metabolic rate was plus 48 per cent before treatment, mild or severe cardiac failure was present in 63 per cent, and the mortality for the series was 27 per cent. Seventy-four of the patients had toxic adenomatous goiter, and 34 had exophthalmic goiter. The incidence of auricular fibrillation among patients with Graves's disease in their clinic was approximately 15 per cent. Auricular fibrillation due to Graves's disease was found to be more likely transient or paroxysmal than that due to other causes, 23 per cent of the series being of that type. The authors point out that the cardiac manifestations of Graves's disease may dominate the picture and obscure the underlying thyroid disorder, and may even antedate all

other recognizable signs of the Graves's disease causing them. Cardiac hypertrophy was seldom pronounced, and enlargement, when present, was due chiefly to dilatation. The average weight of the hearts of 13 patients coming to autopsy was 438 grams, the 2 heaviest hearts weighed 530 grams each.

Digitalis proved to be less effective than in fibrillation not due to Graves's disease. In 49 instances, in which the digitalis tolerance could be estimated, the average tolerance was 134 per cent of the theoretical normal tolerance. In the very toxic states which sometimes followed operation large doses of digitalis intravenously did not influence the ventricular rate materially.

Following successful treatment of the underlying Graves's disease, recovery from fibrillation was often prompt and striking, and restitution of normal sinus rhythm was often complete. Thyroidectomy, followed by the use of *quimidine*, in those patients in whom normal rhythm did not return spontaneously soon after operation was found to restore normal rhythm in approximately 90 per cent of the cases.

Although it is difficult to estimate the relative importance of the increased work the heart must perform as compared to the toxic factor in Graves's disease, the authors feel that the infrequency of hypertrophy and the character of the cardiac disturbances suggest that the latter is of great importance.

In an analysis of 835 goiter cases from the Pacific Northwest states by N W Jones, D B Seabrook and F R Menne (*Ibid*. p 41), auricular fibrillation occurred in 47 per cent, a much smaller percentage than reported by J Parkinson and H Cookson (*Quart J Med* 24 499 (July) 1931). The

majority of the cases belonged to the toxic nodular and the varying mixtures of the hyperplastic groups. The incidence of fibrillation in 5 patients under 40 years of age and in 3 under 30 years, together with the characteristic thyrogenic heart action and the experimental evidence of changes in the hearts of thyrotoxic animals, as observed in their laboratory, suggests the probability of specific thyroid heart lesions.

TREATMENT.—Quinidine Therapy.—From 1923 to 1931 J. P. Anderson (*Ibid* p 128) found the incidence of *auricular fibrillation* in patients with *hyperthyroidism* to vary in different years from 6 per cent to 9 per cent in the Cleveland Clinic. In a series of 2400 cases of hyperthyroidism, 18.5 per cent were in men and 81.5 in women, and of patients with auricular fibrillation and hyperthyroidism, the ratio was 30 per cent. males to 70 per cent females. The presence of auricular fibrillation was seemingly dependent upon the duration of the symptoms and the severity of the hyperthyroidism. In a group of 426 patients with auricular fibrillation who had undergone thyroidectomy, it was found that approximately 45 per cent acquire a normal rhythm within 4 days after operation, about 15 per cent more would develop a normal rhythm if allowed to go untreated (but there is no way of knowing which ones they would be), and the remaining 40 per cent would continue to have an abnormal rhythm indefinitely if not treated with quinidine. In order to obtain the optimum results with quinidine, it must be used from the third to the sixth day following thyroidectomy, and success can then be anticipated in from 90 to 96 per cent of the cases. If treatment is delayed

longer than this, the percentage of failures increases considerably. In 1930 prompt quinidine therapy was made routine treatment in the Cleveland Clinic. All patients still having auricular fibrillation on the third day after operation were given a test dose of quinidine that evening, and if no ill effects were encountered, they were started on the regular schedule the morning of the fourth day. This included 5 grains (0.3 Gm) of quinidine sulphate every 4 hours, day and night for 24 hours, every 3 hours for the next 24 hours, and every 2 hours for the next 48 hours. The pulse was counted before each dose, and if regular, no more drug was administered. Anderson feels that patients in whom normal rhythm is restored after thyroidectomy will not again develop auricular fibrillation, with the exception of the very occasional case with recurrence of hyperthyroidism.

Ergotamine.—M. W. Lev and W. W. Hamburger (*Ibid* p 134) have investigated the value of ergotamine* in *hyperthyroidism*, and its influence on the electrocardiogram in that disease. Four patients were given ergotamine (gynergen)† orally or hypodermically. One case showed an increased basal metabolic rate after 10 days, 1 showed a decrease in 14 days, 1 a decrease in 2 days, and the fourth case, in which Lugol's solution had been combined with ergotamine, a decrease in 11 days.

In the majority of the cases, sub-

* In view of the generally recognized increased activity of the sympathetic nervous system in hyperthyroidism, the use of ergot or ergotamine, which is believed to have a depressing action on the sympathetic system, naturally suggests itself as a means of relief in that disease.

† Gynergen is supplied in tablets of 1 mg ($\frac{1}{60}$ grain) each for oral administration, and in ampules of $\frac{1}{2}$ mg ($\frac{1}{120}$ grain) each for hypodermic and intravenous use.

cutaneous injection of 1 ampule of ergotamine caused a fairly prompt change in the electrocardiogram, consisting chiefly of slowing of the heart rate and an increase in the height of the T wave. In 2 of the 6 patients a prolongation of the P-R interval was produced. In most cases of hyperthyroidism, it caused an increase in the systolic and diastolic blood-pressure, which persisted for at least $\frac{1}{2}$ hour after its administration.

The authors concluded that ergotamine, in the dosage and mode of administration employed, is not so effective as Lugol's solution in reducing the basal metabolic rate, and that it cannot be called a "cure" for thyrotoxicosis. It does, however, contribute to the subjective improvement of the patient, generally favorably influencing the tachycardia, but not more so than Lugol's solution. When used in 2 cases of tachycardia not of thyroid origin, the drug failed to produce a slowing of the heart rate.

GOITER—Size and Shape of Heart.—In a *postmortem* study of 43 cases of goiter, made by J. Parkinson and H. Cookson (*Quart. J. Med.* 24: 499 (July) 1931) at the London Hospital, cardiac hypertrophy was present in "rather more than one-half." There were 35 females and 8 males, whose average age was 37 years and average duration of symptoms 19 years. As a rule, the increase in cardiac size involved both ventricles, sometimes the left more than the right, occasionally the left alone. Predominant or isolated hypertrophy of the right side was never seen. In general, the younger patients and those with the shorter duration of symptoms were the ones who showed no hypertrophy. It was also in the younger patients under 30 years of age that the

rhythm had been regular throughout or fibrillation had come only as a terminal event.

Established fibrillation occurred in older people, the average age at death in 8 cases being 51 years. The heart-weight on the average was greater in those with established fibrillation than in those with normal rhythm, and the greatest increase in heart-weight occurred in those with fibrillation and heart failure. When emaciation was extreme, the heart was only slightly or not at all hypertrophied. In 3 cases where the thyroid gland had not been suspected of producing symptoms, there was cardiac hypertrophy in 2, and perhaps in the third. Evidence of rheumatic heart disease in the form of mitral stenosis was only certainly found once.

In addition, these workers made a *clinical and x-ray study* of the shape and size of the heart (with either a teloradiogram or an orthodiagram) of 130 patients with goiter causing symptoms. Cardiac enlargement was found in about 45 per cent of the cases, usually slight or quite moderate, but not rarely great. In most instances, both contours of the heart were involved, particularly the left, and at times the left only. Although several cases with striking displacement and some stenosis of the trachea were observed, enlargement of the right side of the heart alone was never seen. Electrocardiograms confirmed the radiographic and postmortem findings.

The incidence of auricular fibrillation, including both paroxysmal and established forms, was 27 per cent. Heart failure was present in 12 cases, all of whom had fibrillation, except 1 with a complicating hypertension. Comparison of serial records taken before and after thyroidectomy in 11 cases

with permanent fibrillation showed that there might result no change, an increase or a decrease in the transverse diameter of the heart

Undue prominence of the pulmonary arc was a striking feature of about one-third of the series, sometimes appearing as a convexity on the left profile, sometimes combining with an enlargement of the heart to the left to render this profile straight. Exaggeration of this arc was often found to be an early change preceding any enlargement of the heart chambers. (Postmortem measurements often showed dilatation of the pulmonary artery.) Enlargement of the left auricle out of proportion to that of the other chambers of the heart was not present. Sometimes the superior vena cava was prominent, and in about one-third the aortic arch was higher than normal in the chest. Occasionally, the form of the vascular pedicle was modified by a retrosternal goiter.

In cases with mild symptoms, the heart was normal in shape and size. As found in the postmortem series, the greatest enlargement occurred in patients with auricular fibrillation and heart failure. In final analysis, the form characteristic of the goiter heart is a combination of prominence of the pulmonary arc, of the left ventricle, and to a minor extent of the right auricle. The enlargement may be general, the contour retaining much the same shape as the normal heart, whereas, in almost all other forms of cardiac disease causing enlargement, there is alteration of the shape. Pronounced changes in the left arcs, however, produce a distinctive picture with its straight left border and a right auricular arc only slightly enlarged. In these cases, the heart outline, viewed from in front, resembles a ham. This picture differs

from that of mitral stenosis in the relatively slight prominence of the right auricle and the fuller aortic knuckle in the anterior view, and in the absence of left auricular enlargement in the first oblique position. It approximates more closely the cardiac outline of combined mitral stenosis and aortic insufficiency.

The authors conclude that x-ray examination is helpful in judging the presence or severity of a cardiac lesion in a patient with goiter, and that when cardiac enlargement is present, it is an added reason for, rather than a contraindication to, surgical treatment.

MYXEDEMA HEART.—Treatment—In a series of 17 cases of severe or moderately severe myxedema, studied by G. Fahr (Am Heart J 8:91 (Oct) 1932), 13 (75 per cent) showed signs or symptoms of heart failure, all of which disappeared after giving thyroid extract. The oldest patient was 70 years of age at the time symptoms and signs of myxedema and heart failure developed, and the youngest was 19 years old. In 5 cases (30 per cent) the degree of heart failure was very severe, and the volume of the heart was increased approximately 100 per cent. The symptoms and signs of heart failure are relieved promptly by the administration of thyroid extract. The dosage should be sufficient to bring the basal metabolic rate to -5 to 0. Fahr calls attention to the fact that many cases of myxedema are complicated by coronary arteriosclerosis, and that, when the coronary involvement is extensive, the use of thyroid extract may be contraindicated. The myxedema heart is a feebly beating heart, with flow through the coronary arteries during systole as well as diastole, whereas, in vigorously contracting hearts, coronary flow occurs almost entirely in diastole. If the

coronary arteries are hardened and not able to dilate, and if the diastolic blood-pressure does not rise, the flow through the coronary arteries may be diminished through the stronger contractions produced by thyroid extract administration. In these cases, if angina pectoris develops after treatment with thyroid extract or increases in frequency and in intensity, or if the symptoms of heart failure do not decrease, then thyroid extract should not be given or given only in reduced amount. The clinical history of a patient with severe coronary arteriosclerosis and almost complete occlusion (as shown by autopsy) is presented, in which thyroid medication was presumably responsible for freeing a piece of mural thrombus and subsequent sudden death from a cerebral embolus. However, it is nearly always safe to give thyroid extract a trial, basing the dosage on the phenomena produced by it. In Fahr's experience, digitalis is of little value in most cases of myxedema.

D. Ayman, H. Rosenblum and M. Falcon-Lesses (*J A M A* 98:1721 (May 14) 1932) report 2 cases of "myxedema heart" without evidence of cardiac insufficiency. Both patients presented clinical, x-ray and electrocardiographic manifestations characteristic of the condition, which became normal after adequate thyroid medication. Enlargement of the heart and its return to normal with adequate thyroid treatment is stressed as the one diagnostic feature of "myxedema heart," since the other abnormalities are usually found in all cases of myxedema. The authors call attention to the fact that factors other than thyroid medication may decrease the size of the heart during treatment for myxedema. Decrease in cardiac size may follow improvement of severe secondary anemia; "compensa-

tory dilatation" of the heart in cases of obesity has been reported as disappearing with loss of weight, and errors in x-ray technic of measuring the heart might give apparent increase or decrease in size. In that less than 30 per cent of the reported cases of "myxedema heart" showed objective evidence of cardiac insufficiency, such as cyanosis, râles at the lung bases, enlarged liver, and pitting edema of the ankles, they believe that the diagnosis of "myxedema heart" does not require the presence of signs or symptoms of cardiac insufficiency. The suggestion is made that "myxedema heart" may be more common than is usually supposed, and, therefore, the need of securing serial teleroentgenograms of the heart and electrocardiograms before and during the treatment of every patient with myxedema is indispensable to exclude the possibility of its presence.

In reporting a case of myxedema heart disease, J. R. Gallagher (*Yale J Biol and Med* 5:75 (Oct) 1932) also emphasizes the importance of making serial x-ray studies of the heart before and during thyroid medication. The patient, a male, aged 57 years, was admitted to the Pennsylvania Hospital, Philadelphia, February 10, 1932, with a basal metabolic rate of minus 57 per cent. Clinical data concerning the patient's course are shown in Table IX.

HEART TRAUMATISM—Of academic interest is the report by I. Berner (*Nordk mag f Laegevidensk.* (Aug) 1932) of a case of *rupture* of the heart sustained in a fall by a male of 28 who had fallen from the fourth floor to the ground, landing on his chest. Death was almost immediate. Autopsy disclosed a 9 cm rupture in the left ventricle parallel to the cardiac axis. The diaphragm was also ruptured. There

TABLE IX

Date	Feb 11	Feb 22	March 9	April 2
Weight (lbs)	158	154 $\frac{3}{4}$	148 $\frac{1}{4}$	138
Red blood cell count	2,700,000	3,300,000	3,300,000	3,700,000
Basal met rate	—57%	—38%	—8%	
Trans diam of chest	27 2			26 9
Trans diam. heart (cm)	16 3			13 5
Cardio-thoracic ratio	0 60			0 50
Cardiac area (sq cm)	134			105
Thyroid ext (gr) daily	1 0	1 5		1 0

was no evidence of either having been lacerated by a bone fragment; the explanation of the probable sequence of events was as follows. With impact on the chest, the anterior thoracic wall was forced downward and posteriorly, the compression primarily forcing the heart through the diaphragm and the pressure continuing, the heart muscle itself gave way.

Of very practical importance is the report by D C Elkin and H S Phillips (*J Thoracic Surg* 1:113 (Dec) 1931) of 2 cases of *stab wounds* of the heart with recovery after operation because of the opportunity taken to study electrocardiographic changes where vascular damage of considerable degree was sustained by a human subject. In both instances the wounds were ventricular in situation, one in the right ventricle, the other in the left. In the one, the descending branch of the left coronary artery and vein had been cut and tied. Electrocardiographic tracings were made immediately on admission, approximately 40 minutes after the injury, which were practically normal, "except for a changing form of P wave the significance of which is obscure." A second set were taken during operation. "Lead II, the predominating type of complex, is a ventricular premature beat, thought to be due to mechanical stimulation produced by handling the heart. This closely simulates the record of a dying

heart." A tracing 10 minutes after operation "practically normal except for a slight elevation of the take-off of the T wave in Lead I and a depression of the R-T interval in Lead I." *The changes of coronary occlusion did not develop for 36 hours*, being shown first in the tracing taken at that time. Evidence of healing gradually developed in the tracings, and were practically complete in 6 months. The important thing is the 36-hour interval in development of the changes of occlusion, which indicates a lack of immediate value of electrocardiographic studies where differential diagnosis as against early acute abdominal disease is desirable.

With increased activity in thoracic surgery, whether the primary procedures have been directed toward the respiratory or vascular systems, it is becoming more and more evident that disturbances of the balance of intrathoracic pressures is of extreme importance. With the development of simplified methods of positive-pressure intratracheal anesthesia, the problem of lung expansion appeared to have been completely solved, and with that situation under comparatively easy control, the danger, *per se*, of opening the chest was thought to have been eliminated.

Clinical experience has, however, too often yielded disappointing results developing early, or at other times marking the termination of a steadily pro-

gressive downward course, when infection, anesthesia, or operative shock appeared to offer insufficient reason for the fatality

With the study of venous pressure, minute volume cardiac output, and other phases of cardio-respiratory dynamics, it is demonstrated that the opening of the chest, by bringing intrathoracic pressure to atmospheric level, determines changes in the blood flow through the auricles and great vessels, which, in conditions of limited cardiac reserve, may be enough to immediately produce collapse, or to so reduce cardiac efficiency that recovery is impossible, and progressive circulatory failure ensues

PNEUMOCARDIAC TAMPONADE—Under the title of pneumocardiatic tamponade, covering a study of the effects of atmospheric pressure, negative pressure and positive pressure upon the heart, C S Beck and L Isaac (J Thoracic Surg 1 124 (Dec) 1931) record findings whose value is great in developing an understanding of these problems. By means of a specially devised pressure chamber, variations in intrapericardiac pressure, to the exclusion of direct changes in intrapleural pressure, were obtained through previous operation upon the dogs which had secured attachment of the anterior pericardium to the chest wall. Through the area of adhesion thus produced, an airtight cannula could be introduced into the pericardium, and pressure changes produced in that sac with a minimum of thoracic disturbance. "As the pressure in the chamber was varied, so also did the pressure upon the heart and the intrapericardial portion of the great vessels of the heart." *This latter appears to be the crux of the physics of the situation.* Recording their findings in ex-

tensio, they conclude that it is apparent that the minute volume output of the heart decreases when the pressure upon the heart and the intrapericardial portions of the great vessels at the base of the heart is changed from the usual negative pressure of the thorax to the pressure of the atmosphere. In recovery experiments Beck and Cox found without anesthesia the decrease in minute volume output measured 15 to 30 per cent when the pericardial cavity was opened to atmospheric pressure. The effect of pneumocardiatic tamponade is definitely greater in the dog anesthetized with sodium barbital. The average increase in the experiments with the drug was 36 per cent. This may indicate that the effect of pneumocardiatic tamponade was proportionately greater when the circulation had deviated from the normal, as presumably occurred under anesthesia with this drug. Such reasoning is in agreement with clinical experience. In the human being, the *normal* heart satisfactorily withstands exposure at operation. If the heart has only a relatively slight reserve power, however, the effect of pneumocardiatic tamponade is relatively greater, because under such circumstances the cardiac action may fail completely when the heart is exposed to atmospheric pressure. Negative pressure applied to the pericardial cavity after the latter has been opened to the exterior, brought about an increase in the minute volume output of the heart. The average measurements of this restoration of output was 25 per cent. In only one experiment was the control level approximately restored by negative pressure.

The effect of positive intrapericardial pressure varied with the degree of pressure and the duration of the application. A fall of 63 per cent from the control

level was obtained by the application of pressure equivalent to 7-8-9 cm of water applied during a total period of 30 to 45 minutes. Another point for consideration brought out by the experiments was the slow rate of recovery in cardiac output after positive pressure had been applied. A study of the rate of circulatory recovery after tamponade has been established, merits further work because it carries a practical application. It will afford an explanation, the writers believe, for those fatalities in thoracic surgery that occur hours or even a day or two after the thoracic wound has been closed. In other words, the effect of pneumocardiac tamponage may persist for hours after the tamponade has been corrected, and if the heart cannot make the added effort to overcome this burden, it may, after a long struggle, completely fail.

The clinical application of the measurements presented here is apparent to the surgeon who does thoracic work. That pneumocardiac tamponade may be a factor in bringing about circulatory failure there is no doubt. A patient with a good circulation can withstand the effect of atmospheric pressure upon the heart. If the circulatory reserve is restricted pneumocardiac tamponade cannot be tolerated.

GENERAL TREATMENT.—DIGITALIS AND QUINIDINE.

—In an experimental study, H. Gold, W. Modell and L. Price (Arch Int Med 50 766 (Nov) 1932) found that quinidine and digitalis together produce effects that are almost never seen with either of the drugs alone under the same experimental conditions. In 16 experiments on 11 normal unanesthetized dogs, the effects of quinidine in varying doses intravenously (intramuscularly in 1 experiment) were

studied on the ventricular ectopic rhythms induced by digitalis. It was found that quinidine, even in large doses, produced no change in the cardiac rhythm in the normal dog, but that in the dog with ventricular tachycardia produced by digitalis, quinidine may accelerate or slow the heart rate, change the rhythm from regular to very irregular, or *vice versa*, and induce tetanic convulsions. These effects were due to one or more of the following changes in the cardiac mechanism: (a) slowing of the ventricular tachycardia, (b) abolition of the ventricular tachycardia, (c) auricular, ventricular or complete cardiac standstill, (d) establishment of a nodal rhythm or slow idioventricular rhythm, or (e) reestablishment of a normal sinus rhythm.

Changes in the regularity or irregularity of the rhythm were no guide as to whether a desirable or undesirable change in the cardiac mechanism had occurred (as revealed in the electrocardiogram). Doses of quinidine that were harmless to the normal unanesthetized dog, might produce death as the result of ventricular tachycardia. The auricle (or sinus) also was found to become very sensitive to depression by quinidine during the action of digitalis, so that doses which produced only acceleration of the auricle in the normal dog, might produce auricular standstill during the auricular tachycardia resulting from digitalis poisoning. These effects might be produced by very small doses of quinidine, the equivalent of about from 2 to 6 grains (0.13 to 0.4 Gm) for man. They usually came on within less than 1 minute after the intravenous injection and lasted only a few minutes in most cases.

The effects of quinidine were found to vary not only with the dose of the

drug, but also with the intensity of the digitalis poisoning. If digitalis had caused ventricular tachycardia without A-V block, quinidine would usually re-establish a normal rhythm (sinus (?) tachycardia), but, if digitalis caused an A-V block in addition, quinidine might then produce ventricular standstill after the ventricular tachycardia had been abolished. If small doses of quinidine failed to induce a normal sinus rhythm, large doses also failed to do so, because under these conditions A-V block was usually present (masked by the ventricular tachycardia) and the effect of the quinidine, after slowing of the ventricle, was ventricular standstill.

Ventricular standstill, the result of relatively small doses of quinidine, lasting sometimes for periods up to a minute or longer, was common in the dog with ventricular tachycardia due to digitalis. In the normal dog, large doses of quinidine induced clonic convulsions not associated with any disturbance in cardiac rhythm, probably resulting from a direct action on the central nervous system, while in the overdigitalized dog 2 types of convulsions occurred after quinidine, those appearing after small doses being tonic in character, due to prolonged periods of ventricular standstill. Double vagotomy did not appreciably alter any of these phenomena.

The authors conclude that, while quinidine may produce a temporary desirable antagonistic effect in the case of ventricular tachycardia resulting from digitalis poisoning, the difficulty of obtaining the necessary combination of actions and the possibility of producing ventricular standstill render its use dangerous for this purpose, particularly in the presence of A-V block.

DIGITALIS.—Depression of Vomiting Reflex.—In an experimental

study on animals, H. Gold, J. Travell and N. Kwit (*Am Heart J* 7 165 (Dec) 1931) discovered that the continued administration of large doses of the digitalis bodies may depress the vomiting reflex, while progressively increasing the intensity of the cardiac poisoning, so that after an initial period of vomiting, the continued administration of the drugs may fail to produce emesis and may even cause death without further vomiting. The results of their studies suggest the need of caution in relying upon nausea and vomiting as measures of the degree of cardiac poisoning in the clinical use of the digitalis bodies. Attention is directed to the fact that, in man, gastrointestinal disturbances are usually the first indications of digitalis, but not uncommonly abnormal cardiac rhythms (premature beats, bigeminy, heart-block) appear as the initial signs of toxicity, and occasionally patients receiving large doses of digitalis die under conditions which suggest that the drug may have been responsible for the fatality (although nausea and vomiting were absent).

RESUSCITATION—A. S. Hyman (*Arch Int Med* 50 282 (Aug) 1932) describes the experimental use of an *artificial pacemaker* in resuscitation of the stopped heart. Heretofore, stimulation of the stopped heart by electrical methods has failed because most investigators have attempted to reactivate the heart by neurogenic excitation. By placing the entire organ in the electric circuit, the heart is unable to maintain its normal cycle, and when strong currents were used, the factors discovered in electrocution were seen to be present. The artificial pacemaker, which attempts to simulate the excitation wave developed by the normal sinus nodal pacemaker, consists in a special current

generated by a magneto which can be regulated to deliver impulses to a needle point at a constant regular rate varying from 30 to 120 beats per minute. The 2 electrodes in the needle are so close together that only a small pathway is concerned in the electric arc established by the heart muscle, and from the irritable point an excitation wave spreads over the heart muscle, developing and spreading according to normal physiologic conditions.

Experimental studies on guinea-pigs, rabbits and 1 large dog have shown that the arrested heart can be rapidly returned to automatic sinus activity after the response to the artificial pacemaker has restored some of the normal circulatory balance. The normal activity of the heart is apparently but slightly embarrassed by the artificial pacemaker current, introduction of the irritable focus resulting in a response no wise different from that seen in the extrasystolic arrhythmias. This phase of the problem is extremely important, in that it has been thought that the introduction of the artificial pacemaker current while the heart is beating might do damage to the cardiac mechanism. Hyman is of the opinion that the artificial pacemaker, when correctly used, may prove to be of inestimable value in the restoration of patients now succumbing to cardiac arrest, not responding to the usual methods of therapy.

SURGICAL APPROACH IN CARDIAC OPERATIONS.—With extension of the indications for surgical therapy in cardiac disease, greater attention is being paid to the method of approach, because in some instances the increase in facility with which intrapericardial examination and surgical manipulation may be done will make one approach more acceptable, while in an-

other, as in cases of drainage for pyopericardium, the chief desideratum may be avoidance of contamination of the pleural cavities.

A. M. Shipley (*Surg Gynec Obst* 54:280 (Feb) 1932), in an excellent paper on cardiac surgery, discusses the operative approach to the heart and pericardium. He considers roughly that the different methods fall into 4 groups:

- 1 Some one of the left lateral or parasternal routes, usually ample in wounds of the left side of the heart, arrest of the heart, and thrombosis of the pulmonary artery.

- 2 The approach through the "triangle of safety," in draining an infected pericardium.

- 3 Central sternotomy, in the surgical treatment of valvular disease, foreign bodies in the chambers of the heart or imbedded in the wall of the heart.

- 4 Removal of considerable areas of the precordial bony chest wall, for chronic pericarditis and cardiac hypertrophy.

For approach to the left side of the heart the incision primarily suggested by Spangaro, and modified or added to by others, is favored by Shipley. The description by Shipley is as follows: "The incision extends in the fourth interspace from the anterior axillary line to the margin of the sternum, where the sternal attachments of the third, fourth, fifth, and sixth cartilages are exposed, and as many of them separated from the sternum as is necessary to give good exposure. The exposure is much improved by a rib retractor and the one described by Lilienthal is best known to me. While the Spangaro operation is described as an intercostal approach in the fourth interspace, any interspace may be used that gives the best access to the particular injury."

A case of *stab wound* in the third left interspace just to the left of the sternum is described

The young negro was "unconscious, pulseless at the wrist, but breathing quite well" Auscultation yielded "weak and irregular movements, but no regular and sustained pulsations were made out" The early operative work was done without anesthetic Incision was made in the third interspace, the cartilages of the third and fourth ribs separated and Lilienthal retractor used The internal mammary vessels were tied "The left margin of the sternum was in the way and a half-moon section of it was gouged away with a large rongeur" "During this time there was little change in the patient's condition. He seemed in the act of dying, but continued to live" The opening in the pericardium was enlarged with the steady welling up of bright red blood Because of this type of bleeding, the left auricle was first examined and a small hole in the appendage found The opening in the appendage was grasped with a clamp and a lateral type of silk ligature applied "As soon as the pericardial sac was emptied of blood, the heart began to beat strongly but not very regularly at first, and the patient regained consciousness and began to struggle He was anesthetized with ether The pericardium was closed loosely in order to allow escape of fluid, and the blood was aspirated from the pleura. The lung was expanded and an air-tight closure of the thorax was made Recovery ensued"

The advantage of the intercostal incision where there is no rib resection lies in the ability to approximate the ribs that have been separated by encircling them with heavy sutures and tying them sufficiently firm to lessen the normal intercostal space This approximates the pleura itself and with suture of the soft tissues in layers, an airtight closure is possible

For *pyopericardium* a combination and amplification of the transsternal approach suggested in 1648 by Riolanus, and the transchondral approach of Larrey, 1829, is suggested

In 2 patients the writer used a com-

bination of both of these methods, which is more satisfactory than either, as it is quickly and easily made and has the advantages of both and the disadvantages of neither The sternum is trephined just above the junction of the gladiolus with the ensiform, and a little to the left of the center This burr opening is then enlarged with rongeur forceps to the left until the lateral segment of the sternum and the ends of the fifth and sixth cartilages are cut away This exposes the uncovered portion of the pericardium and the left margin of the pleura, and the internal mammary vessels hardly enter the field It has the great advantage of bringing one down directly on the "triangle of safety" through a bloodless field, and then enlarging the field as much as is necessary to allow incision, examination and drainage of the pericardium

CATARACT. —ETIOLOGY.—

C. S. O'Brien (J. A. M. A. 98 284 (Jan 23) 1932) expresses the opinion that abnormally high concentrations of *sugar* in the body fluids and in the blood may in many cases have a bearing on the etiology of cataract Of 218 patients with advanced senile cataract almost 50 per cent. had hyperglycemia

Radiational cataract caused by x-ray and infrared and radium rays is discussed by J. E. Lebensohn (Am. J. Ophth. 15 953 (Oct) 1932) He states that the lens is more susceptible to radiation than any of the other ocular tissues. About 50 human cases of *x-ray cataract* have been reported in the literature, these cases following heavy dosage with insufficient protection to the eye, usually after a remarkably long latent period, from 1 to 8 years, after radiation. In a case observed by Nordmann, a young boy who was treated for syco-

sis with a single depilatory dose, as a sequel developed bilateral cataracts some years later. Cataract produced by x-ray shows certain definite characteristics. A plaque-like opacity bordered by a zone of powdery opacity lies directly opposite the pupillary area in the posterior cortex of each lens. *Fire cataract* is found among glass-blowers, tin-plate rollers, furnace men, puddlers, foundry men and chainmakers. Ultraviolet radiation is not a factor in the production of human cataract. Experimentally, at least 12 hours of continuous ultraviolet radiation was necessary to produce permanent changes in the lens.

F. W. Law (Brit J Ophth 16 385 (July) 1932) believes that unocular *zonular* cataract is almost invariably produced by a nonpenetrating *injury*. The opacity is produced by disturbance of the nutrition of the lens, brought about by severance of the physiologic relationship between lens and capsule, with a consequent alteration in the capsular permeability.

P. Vancea (Arch d'opht 49 78 (Feb) 1932) states that about 70 to 80 cases of spontaneous absorption of cataract have been reported in the literature to which he adds 2 cases of congenital cataract, 1 of which showed partial and the other complete absorption. He believes that *hypofunction of the pancreas* tends to produce cataract, while *hyperfunction* aids its absorption.

TREATMENT.—Nonsurgical Treatment.—J. Green (Arch Ophth. 5 350 (Mar.) 1931) substitutes a 2 per cent. solution of suprarenin bitartrate for glaucosan, and has found that his results with this drug have been as satisfactory as those produced by levoglaucozan.

D. B. Kirby (*Ibid* 5 754 (May) 1931) finds that in cataract cases no im-

provement in the vision or objective appearance was brought about by the administration of *parathormone*.

Surgical Treatment.—Before operating on cataracts resulting from tetany, C. S. O'Brien (*Ibid* 7 71 (Jan) 1932) suggests that *parathyroid hormone*, *viosterol* and a high calcium intake should be administered to avoid postoperative spontaneous hemorrhage.

The 3 favorite methods of intracapsular extraction, *ie*, the Smith Indian, Barraquer, and the forceps method as practiced by Knapp with Kalt forceps, are discussed by L. F. McAndrews (*Ibid* 5 93 (Jan) 1931), who forms the following conclusions: (1) the intracapsular operation is rapidly gaining ground in America and Europe, (2) classical capsulotomy is the most popular method of cataract extraction, (3) the Smith method is apparently falling into disuse, (4) the Barraquer method is not frequently employed here or abroad, and (5) the forceps method is at present the most popular procedure for intracapsular cataract operations.

Following a theoretical and practical study of the intracapsular method of cataract extraction, R. Castroviejo (Am. J Ophth 15 406 (May) 1932) concludes that Smith's operation is inferior to those of Elschnig and Barraquer, because of the greater number of complications, particularly loss of vitreous, incarceration of the iris and deviation of the pupil inward. Elschnig's forceps method unites the advantages of both the Smith and the forceps methods and possesses none of the disadvantages of either. Elschnig's method gives rise, however, to 20 to 30 per cent of ruptured capsules. The Barraquer is considered the best and most perfect of the intracapsular operations. It gives good

visual results and few complications. For juvenile and traumatic cataracts, with posterior synechiae, the classical method is necessary. Castroviejo quotes Ellett who states that "the trend in cataract operation was rather definitely indicated and one might speak of the 'modern cataract operation' as being an extraction in the capsule with a peripheral iridectomy, and suture of the conjunctival flap."

A new method of intracapsular extraction which he performed with good results in 22 cases is described by I. Abramowicz (Klinika Oczna, p. 11 (June) 1931). His procedure is as follows: (1) injection of novocaine into the fibers of the orbicularis muscle, (2) preliminary suture of the cornea with or without canthotomy and superior rectus fixation, (3) incision at the limbus which includes one-half of the corneal circumference, (4) iridectomy; (5) removal of the speculum, (6) the careful introduction of Smith's flat spoon behind the lens while slight pressure is exerted upon the lower part of the cornea with a Daviel's spoon, (7) the extraction of the lens by the application of Snellen's loop to the anterior surface of the lens. This is performed after rupturing the zonula by lateral movements of the loop. The spoon is then removed and the suture is tied.

H. Ferrer (Am. J. Ophth. 15:324 (Apr.) 1932) recommends the routine use of the tonometer preliminary to cataract extraction in order to determine what operative procedure to follow. If the intraocular tension is normal, the choice of operative procedure is unrestricted. If subnormal, the pupil should be widely dilated with atropine to promote ease of delivery of the lens, otherwise it is likely to be luxated when pressure is exerted upon it during extrac-

tion. If the tension is increased atropine is contraindicated, the tension in such cases should be lowered before extraction. Ferrer is of the opinion that atropine before or after dissection is frequently dangerous. If indicated, tonometric measurements may be made on the twelfth postoperative day.

A new instrument for extraction of cataract has been devised by J. L. Lacarrere (Klin. Monatsbl. f. Augenh. 88:778 (June) 1932). Because of its perforating and coagulating action, a high frequency current is utilized as traction power. The needles penetrate the anterior capsule and coagulate the entire lens and capsule into a solid mass which is removed by traction. This method is particularly effective in intumescent cataracts in which the semi-liquid masses are coagulated and extruded. He reports that good results were obtained in 10 cases.

O. Barkan (Am. J. Ophth. 15:117 (Feb.) 1932) recommends his procedure for the extraction of *congenital*, *soft* and *membranous cataracts*. Hypotony and maximal dilatation of the pupil are produced by a subconjunctival injection of epinephrine, 1:1000. An oblique valve-like incision 2 mm. within the cornea, is then made through which, without iridectomy, the lens and capsule are removed. He reports 5 cases with excellent postoperative results.

Iridencleisis, used by only a few operators during the past 25 years, is becoming more popular, according to W. F. Hardy (*Ibid.* 15:37 (Jan.) 1932). The fear of incarceration of the iris in this operation has deterred many. The dread of sympathetic ophthalmia will probably prove to be without foundation.

The following improvements in the technic of preparing for cataract opera-

tions are recommended by E Oláh (*Ibid* 15 626 (July) 1932) akinesia of the eyelids, orbital anesthesia, canthotomy, a suture in the superior rectus muscle, and mechanical immobilization of the eyelids by an improved eyelid speculum

SENILE.—TREATMENT.—The pathogenesis and the nonoperative treatment of *senile cataract* is discussed by A Siegriest (*Ann d'ocul* 169 696 (Sept) 1932), who reports that the results he obtained with *paraphakine* were strikingly confirmed by the research work of Koteles in the Grosz Clinic at Budapest Koteles believes that *paraphakine* will not only prevent the formation of cataract, but will also maintain the health of those advanced in years She believes that *senile cataract* is the result of premature involution of the endocrine system in general and of the parathyroid in particular

A detailed account of the routine employed in preparation and operation for the removal of *senile cataract* by the Barraquer method is given by W. J Harrison (*Am J Ophth* 15.104 (Feb) 1932). He analyzed the results obtained in 117 cases and enumerates the advantages of the Barraquer method as follows shortened convalescence, good visual acuity, total absence of potentially inflammatory remains of lens and capsule and no loss of vitreous, the latter being practically eliminated because no pressure is exerted during this operation.

CEREBRAL BIRTH PALSIES.

—Edgar A Doll (*Proc Am A. Study of Feeble-minded* 56 304, 1932) reports some of the results obtained after 4 years' work at the Vineland Training School at Vineland, New Jersey, on a group of 44 patients with cerebral

palsies believed to have resulted from birth injuries Although the author's criteria for assuming that his cases are necessarily the result of injuries incident to birth may be open to question, he does bring out some interesting and important phases of the subject. It is pointed out that in estimating the intelligence of "birth-injured" mentally deficient children, the examiner is confronted with serious difficulties of speech and movement which interfere with the expression of such intelligence as may be present and, because of these difficulties, the intelligence of such children is usually seriously underestimated Even if their intelligence is properly rated, their functional ability falls far below their native capacity because of the motor handicaps, and increases of intelligence in these children go unnoticed because their expressive abilities remain dormant in the absence of suitable training It was found necessary to apply various types of psychological tests to accurately estimate the patients' true intellectual levels The subjects examined over a period of years with the Stanford-Binet scale showed a degree of late mental development beyond that usually found with the ordinary feeble-minded, which was considered significant as a hopeful prospect of training as the children grow older **Physical therapy and muscle training** were utilized in the most favorable of the cases

Leon Freedom (*Arch Neurol and Psychiat* 26.524 (Sept) 1931) has reported in detail a case of cerebral birth palsy which he could not classify in any known nomenclature and considers it as a cerebral degenerative "process" of unknown etiology, progressive, but with remissions and exacerbations starting at birth, and continuing over many

years. The typical triad of infantile cerebral palsy, *i.e.*, motor phenomena, epilepsy and idiocy, was present. The author considers that his case demonstrates the importance of the observation for progression as a clinical manifestation in the birth palsies.

CESAREAN SECTION.—It is claimed by A. J. Skeel and F. F. Jordan (*Am. J. Obst. and Gynec.* 23:172 (Feb.) 1932) that the primary or basic operative risk of the Cesarean operation is high (1 to 2 per cent). There is also a definite late or delayed mortality present with every pregnancy and labor occurring after one Cesarean section. These considerations make the decision to perform the operation a grave one. The risk is real even under favorable circumstances. However, statistics such as are being published from time to time showing the rapidly mounting number of deaths following Cesarean section should not be used as evidence that the operation is being abused. Such statistics merely show the more general use of this procedure in the treatment of grave pathologic conditions complicating pregnancy and labor. The advisability of Cesarean section for placenta previa, ablatio placentæ, preconvulsive toxemia, etc., can be determined only by comparison of the results with those obtained by other methods of handling the same conditions. The mature trained judgment of an expert obstetrician is necessary for such a decision. In the authors' series the low, or cervical, operation gave a definitely lower mortality rate than did the classic. They advise its use in all potentially infected cases. In those with definite sepsis, the Porro operation should be considered. Their series shows, as do preceding ones, that the mortality following

Cesarean section for eclampsia is unjustifiably high. It is not good treatment for this condition.

CONTRAINDICATIONS.—Most fatal Cesarean sections of today, according to W. R. Cooke (*J. A. M. A.* 99:1823 (Nov. 26) 1932), are performed in the presence of contraindications. Pain, fatigue, fear, or the safety of the child must rarely be considered as excuses for this operation. He sounds a timely warning when he states that the mortality following Cesarean section would be greatly reduced if the contraindications were generally recognized and the operation avoided when contraindicated. The most common sources of potential infection are:

- 1 Vaginal examinations. It has been demonstrated beyond dispute that with each vaginal examination, no matter how carefully conducted, the puerperal morbidity is apt to increase.

- 2 Failure of attempted obstetric maneuvers by the vagina. This constitutes an absolute contraindication to section.

- 3 The duration and stage of advancement of labor. Organisms can practically always be found in the uterus of a patient who has been in active labor, in whom the cervix has been materially dilated, or in whom the membranes have been ruptured for as long as 4 hours.

- 4 Improper environment, an improperly prepared patient and untrained assistants are to be considered as elements of potential infection.

- 5 Inadequate prenatal precautions. The vagina has a remarkable capacity for destroying pathogenic organisms if left to itself for as long as 2 months. This capacity is nullified by invasion of the vagina examinations, douches, treatments or intercourse during the last 2 months of pregnancy.

6 Active infection elsewhere in the body or in the contacts of the patient or attendants, especially streptococcal conditions (such as erysipelas, scarlet fever, streptococcal angina or pneumonia), must be considered as seriously potential of producing puerperal infection

The majority of obstetricians have observed such a tremendously decreased resistance to infection in cases of convulsive eclampsia that section is never performed on this indication alone, or except on the most absolute indications

Even in unskilled hands, the procedures alternative to Cesarean section carry a total maternal mortality risk from shock, hemorrhage and infection less than that of Cesarean section performed in the presence of contra-indications

TEMPORARY EXTERIORIZATION OF UTERUS (PORTES' OPERATION).—J Devraigne and M Mayer (*Gynéc et obst* 25 15 (Jan) 1932) claim that a Cesarean section with temporary exteriorization of the uterus (Portes' operation) may conserve the uterus of young women in whom a simple corporeal operation would be dangerous. Portes' operation is especially recommended in cases of infection. The authors report 8 instances of Cesarean section (0.07 per cent) performed with exteriorization of the uterus among 9741 deliveries over a period of 6 years. In 2 of the patients only a Cesarean section with exteriorization was possible, in the other 6 a low Cesarean section was performed. The reintroduction of the uterus was made after a period of 20 to 72 days. In every case except one, the reintroduction was made easily, only several omental adhesions were noted (1 case). Live infants were obtained in 6 of the

interventions. The author concludes that Portes' operation is legitimately indicated in rare instances of infection in which a conservative operation may menace the life of the patient and in which a mutilating operation is to be avoided

CHOKED DISC (PAPILLOEDEMA).—A case of choked disc (papilledema) evidenced by swelling of the papilla, blurring of the disc margins, small punctate hemorrhages on the disc and marked venous turgescence is reported by A. E. Bulson (*J. A. M. A.* 97 926 (Sept 26) 1931). The x-rays revealed a cloudy left sphenoid sinus. Drainage of this sinus released pus under pressure and was followed by reduction in the papilledema and recovery of normal vision. Bulson believes that suppurative infection of the sphenoid sinus is definitely established as a cause of papilledema.

CHOREA MINOR.—TRANSMISSION.—R. G. Waller (*Brit. M. J.* 1 282 (Feb 13) 1932) reports the occurrence of chorea in 3 sisters. The author points out that the probability of contagion in the 3 cases is enhanced by the fact that the sisters had occupied the same bedroom for a number of years. Furthermore, the disease appeared simultaneously in 2 of the 3 sisters. C. O'Donovan (*Brit. M. J.* 1 284 (Feb 13) 1932) called attention to a somewhat similar situation in which 2 sisters and a neighbor girl developed the disease, all within a short period of time.

ETIOLOGY.—Age.—In the cases of R. H. Dennett and S. Wetchler (*J. Pediat.* 1 203 (Aug) 1932), 46 were between the ages of 8 and 12 years, the youngest child treated being 4 years and the oldest, 14.

Sex—Of the 73 cases studied by Dennett and Wetchler, 46 were *females* and 25 were *males*

Previous Attack—Nine of Dennett and Wetchler's cases had had a previous attack, 1 case, 7 previous attacks, and 24 cases, or one-third, from 2 to 5 attacks

Season.—According to Dennett and Wetchler, nearly one-half of their cases were admitted to the hospital during the summer, from May to September, while only 9 cases were admitted during the months of December, January and February

Shock or Fright.—Six of the cases studied by Dennett and Wetchler had a definite history of shock or fright, or sudden pain and 1 had intestinal parasites

According to E. Osipoff (*J. nevropat. i. psikhiat.* 24:120, 1931), the appearance of chorea minor is dependent not only on a toxico-infectious factor, but also on an inherited predisposition to the disease

Specific Cause—The etiologic factor in the cases of chorea reported by Dennett and Wetchler was definitely rheumatic in 29 cases. In 16 cases there was no known cause, while in 7, recurring attacks of tonsillitis had been noted. Other probable causes of the chorea were carious teeth, frequent recurring upper respiratory infections, and a few of the cases followed pyelitis.

PATHOLOGY—According to P. Van Gehuchten (*Rev. Neurol.* 1:490 (Apr.) 1931), Lhermitte and Pagnitz, from anatomical studies, suggested a double form of chorea, one form being *inflammatory* and the other *degenerative*. Van Gehuchten believes that this conception depends upon the duration of the process in the particular cases studied. When the disease has lasted a

few days, the *inflammatory form* is found, when it has persisted from 1 to 2 months, the *degenerative form* is found. The author reported a study in a boy in whom typical chorea had been present for 15 days before death. Necropsy findings showed a transition between the two forms. Degenerative lesions were found in the thalamus, caudate nucleus, putamen, and certain areas in the cerebral cortex.

These areas seemed to be the first injured and the inflammatory process was subsiding. Similar but much less degenerations were found in the dentate nuclei and Purkinje cells of the cerebellum. Evidence of fresh inflammation was found in the corpora quadrigemina, red nucleus, and reticular formations. The toxic process thus had spread caudad from the basal ganglion. The primary and essential lesions in chorea are, therefore, in the thalamus, caudate nucleus, putamen and perhaps certain areas of the cerebral cortex.

TREATMENT.—Dennett and Wetchler (*loc. cit.*) state that they have treated chorea with every reputable therapeutic measure, notably large doses of salicylates, sedatives and the various arsenical preparations. Whenever possible, cases were hospitalized and probable foci of infection removed. Often the duration of the disease was not shortened, and serious cardiac complications were not prevented. However, with the introduction of *nirvanol*, their results have been most gratifying.

Nirvanol.—Dennett and Wetchler (*loc. cit.*) state that the dosage of nirvanol was dependent upon the age of the child, its size and weight, the severity of the attack, and, strangely enough, upon weather conditions. The authors feel that the failure of the treatment reported by others is due to too small a

dosage or to too short duration of the treatment. Never less than 10 grains (0.65 Gm) a day was given to children over 6 years of age, and all large, robust children over 7 or 8 years received 15 grains (1 Gm) a day. The minimum total dose given to any child was 25 grains (1.6 Gm) and the maximum, 215 grains (14.1 Gm). The average total dosage was 70 to 90 grains (4.6 to 6 Gm); about one-half of the children received this dosage. Smaller doses are recommended during hot weather. The average length of treatment was 6 to 10 days, always being governed by the onset of fever and rash, unless these symptoms failed to appear.

The same dosage was used by R. M. Murray-Lyon (Edinburgh M. J. 39:368 (June) 1932) for all cases with the exception of 1 patient who developed an idiosyncrasy to this drug. The drug was given in oral doses of 0.3 grains (0.02 Gm) once daily until a rash appeared, or for 12 to 13 days if no rash developed.

The powdered drug was administered routinely by G. F. Weinfeld and R. Cohen (J. Pediat. 1:210 (Aug) 1932) in doses of 0.1 Gm (1½ grains) 3 times a day for at least 7 or 8 days, and if a nirvanol effect was obtained in that time, the treatment was discontinued. If, however, the effect was not obtained, the dose was increased and continued for a maximum of 21 days. It has been recommended that the drug be given until nirvanol sickness develops, the accepted signs being rash, fever, stupor, leukopenia and eosinophilia.

Fatalities that have been reported with nirvanol treatment, according to Dennett and Wetchler, have been due to: (1) overdosage, (2) not stopping the drug soon enough, (3) giving the treat-

ment during an acute complicating disturbance, (4) some cause other than nirvanol.

Results of Nirvanol Treatment—The symptoms of the 72 cases treated by Dennett and Wetchler (*loc cit*) all disappeared in 21 days. No harmful effects of the treatment were observed. Of the 72 cases, 13 recurrences have been observed to date. The authors conclude that nirvanol is the treatment of chorea for the individual attack. Murray-Lyon (*loc cit*) reported satisfactory results in the treatment of 15 cases of chorea. The duration of the treatment was appreciably less than that for control cases. Weinfeld and Cohen (*loc cit*) on the other hand, have concluded that the treatment has been consistently without results. T. D. Jones and J. L. Jacobs (J. A. M. A. 99:18, 1932) produced "nirvanol sickness" in 3 obstinate cases of chorea without permanent benefit. One of the patients suffered a dangerous reaction to the drug.

Foreign Protein Injections.—G. Weinfeld and R. Cohen (*loc cit*) gave *typhoid vaccine* intravenously to 2 patients after they failed to respond to nirvanol therapy. In both cases improvement was spectacular and immediate following the vaccine therapy. J. H. Pritchett (Kentucky M. J. 30:291 (May) 1932) treated a child with chorea by means of intramuscular injections of *streptococci bacteriophage*. Four to 5 injections were given in ½ to 2 c.c. doses at two-day intervals. The reaction produced was drowsiness and fever, which lasted about 3 hours. No spectacular results were noted, but there was a marked gradual improvement over a period of 10 days.

Forced Spinal Drainage.—G. M. Retan (J. A. M. A. 99:826 (Sept. 3)

1932) used forced spinal drainage in the treatment of 2 cases of chorea (see Poliomylitis Treatment)

CHOROID.—T M Shapira (Am J Ophth 15 721 (Aug) 1932) reports 2 cases of *heteroplastic ossification* of the choroid. He finds (a) that bone formation takes place in the choroid because of the great vascularity of that tunic of the eyeball; (b) that ossification results after years of continued inflammation; (c) that bone may be found in the retina, cyclitic membranes, lens, iris and ciliary body, as well as in the choroid

CINCHOPHEN. — *Poisoning.* — Each year many cases of poisoning following the administration of cinchophen are added to the list of those previously reported. The toxic manifestations as listed by S L Gargill (New England J Med 206 183 (Jan 28) 1932) usually take one or more of the following forms (1) *cutaneous manifestations*, such as pruritus, angioneurotic edema, urticaria, macular and papular rashes, (2) *anaphylactoid reactions* characterized by neurocirculatory disturbances associated with rapid pulse and lowered blood-pressure, (3) *gastrointestinal disturbances*, including simple ulcers of the mouth, pyrosis, nausea, vomiting and diarrhea, and (4) *liver involvement*, varying from a toxic hepatitis to acute yellow atrophy of the liver

Gargill, in reporting 3 cases of poisoning, states that a study of the cases of cinchophen poisoning reported in the literature reveals that the toxic manifestations have no relation to the amount of cinchophen taken and that such manifestations are often deferred for weeks after the drug has been discontinued. Thus, de Rezende (Brazil-

med 41 1005 (Sept 24) 1927) reported a case which developed toxic hepatitis after taking only 30 Gm (45 grains) of cinchophen, while Hench saw a patient who had taken large amounts of cinchophen over a period of 18 years without the slightest discomfort or disability. This would seem to indicate, Gargill believes, that certain predisposing conditions must obtain, which sensitize the liver to the toxic action of cinchophen preparations, before untoward effects are manifested. Such predisposing conditions, according to Rabinowitz are, gall-bladder disease, cirrhosis of the liver, pregnancy, chronic alcoholism, chronic nephritis, a past history of jaundice, and the sensitization of the liver to protein whether by surgical trauma, inhalation, ingestion or parenteral injections

G A Winfield (Canad M A J 26 170 (Feb) 1932) reported 3 cases of toxic hepatitis due to cinchophen, one of which was fatal

S C Lind (Ohio State M J. 28 28 (Jan) 1932) in reporting a case of acute yellow atrophy of the liver due to a small amount of cinchophen (total of 90 grains—6 Gm), expresses the opinion that, in addition to the number of deaths resulting from cinchophen poisoning which have been reported in the literature, there are a still larger number unreported

COLDS, COMMON. — Common colds which are so prevalent from late fall until spring, continue to be the problem for considerable research work, as well as the subject for a voluminous literature. This disease exceeds in number the combined total of all other diseases. Each year announcements are seen of large sums of money appropriated and commissions appointed to

dis-cover the cause and treatment of this most disabling disease

ETIOLOGY — Although there is no scientific proof regarding the relationship between chilling of the body, exposure to damp and cold, and the production of common colds the history in a large percentage of cases shows that a cold followed exposure to abnormal environmental conditions. In attempting to arrive at some definite conclusion regarding this phase of the problem, C-E A Winslow and L Greenburg (Am J Hyg 15 1 (Jan) 1932) report that a *localized draft* on the head caused a fall in the skin temperature of the face and in the temperature of the nasal mucosa.

The amount of vasoconstriction of the head areas was considerably less with exposure to a given local atmospheric temperature when the given effective temperature affected the whole body. The head areas recovered their normal temperature rapidly after the cessation of a local draft. Exposure of the head to a local draft caused little change in the trunk, thighs and legs, but was followed by distinct reflex vasomotor changes in the hands and feet. A slight chilling caused a rise in the skin temperature of the extremities, while a more severe chilling produced a fall.

A localized draft on the feet caused a marked and sharp fall in the skin temperature of the soles of the feet, which was followed by slow and incomplete recovery after cessation of the draft. As in the case of a draft on the head, however, the exposed part did not show as much vasoconstriction at a given effective temperature produced on the feet by a local draft as it did when the whole body was exposed to the same effective temperature.

Chilling of the feet by local drafts produced no marked and consistent re-

flex changes in the face, hands, trunk or thighs and legs. It caused, however, a distinct reflex rise in the temperature of the nasal mucosa and a less marked rise in the temperature of the oral mucosa. There was nothing in the author's observations to indicate that localized drafts produce any derangements of vasomotor reaction differing in such a way from those caused by uniform chilling of the body surfaces as a whole, as to suggest a special influence on respiratory infection. Chilling of the head caused less vasoconstriction of the mucous membranes than exposure of the entire body to a corresponding effective temperature, and chilling of the feet actually caused dilatation of the blood-vessels of the nose and throat. The authors' work does not confirm the general belief that chilling of the feet is especially harmful.

It is believed by many that common cold is due to a *filtrable virus* and that the complications arising from a coryza such as sinusitis, otitis, mastoiditis and pneumonia are due to organisms which, under the normal conditions of the individual, are quiescent, but with the onset of a cold they are activated to greater pathogenicity.

Y Kneeland, Jr and C F Dawes (J Exper Med 55 735 (May) 1932) record bacteriologic and clinical observations on respiratory disease in a semi-isolated infant population over a period of 2 years. In 2 severe winter outbreaks of respiratory infection, a parallel rise in the carrier rate of pathogenic organisms was noted. The first autumn outbreak of colds seems to favor the dissemination of the pathogenic organisms. The relationship of colds to the severer infections is roughly reciprocal. Infants between 8 and 14 months of age are subject to the most

severe infections. The number of infants showing positive skin reactions to products of pathogenic organisms increases during the winter months.

TREATMENT—The treatment of the common cold is prophylactic and symptomatic. Many individuals are susceptible to colds, and in these many predisposing factors will be found, such as deviations of the nasal septum with resultant poor ventilation, chronic sinus disease, chronic nasopharyngitis due to adenoids, etc. Overeating, lack of exercise, poor intestinal elimination, too much or too little clothes, overwork and improperly ventilated living quarters, are all factors that must be dealt with. The symptomatic treatment is both general and local.

Although vaccines have been used in the *prevention* of common colds, their value remains doubtful. The statistical results of an experiment performed by W. E. Brown (Am J Hyg 15:36 (Jan 11) 1932) on the value of vaccine in the prevention of the common cold show little, if any, improvement as

ceived some benefit. This is in accord with the observations that the group as a whole was not completely desensitized to the particular antigens used. Better results may be possible with an increased dosage of the vaccine or by employing with each individual the particular antigens to which he may be shown sensitive.

COLON.—CHRONIC IRRITABLE COLON.—TREATMENT.

—In an effort to evaluate the effectiveness of vaccine therapy in irritable colon therapy, and also to study the validity of the allergic theory of etiology, J. G. Mateer and J. I. Baltz (Ann. Int. Med. 5:982 (Feb.) 1932) studied 68 cases in which autogenous stool vaccines were found to give positive reactions to intradermal skin tests. All patients in this group had been treated by other measures previously without definite relief of symptoms. Vaccine therapy was the only change in the previous program. In the majority of cases relief was obtained.

TABLE I.
PRACTICAL THERAPEUTIC RESULTS OF AUTOGENOUS STOOL VACCINE INJECTIONS
UPON SYMPTOMS OF 68 CASES *

	Colon Pain	Pylorospasm Syndrome	Constipation	Headache	Vertigo
Number of cases	57	29	34	23	11
Symptoms aggravated	2 (3%)	1 (3%)	0	2 (9%)	0
Symptoms unchanged	9 (16%)	8 (28%)	8 (24%)	8 (35%)	5 (46%)
Slight improvement	8 (14%)	3 (10%)	4 (12%)	1 (4%)	2 (18%)
Moderate improvement	11 (19%)	2 (7%)	4 (12%)	2 (9%)	0
Marked improvement	9 (16%)	2 (7%)	5 (14%)	4 (17%)	1 (9%)
Complete relief	18 (31%)	13 (45%)	13 (38%)	6 (26%)	3 (27%)
Total cases improved	46 (81%)	20 (69%)	26 (76%)	13 (56%)	6 (54%)

* Cases with persistence of symptoms after other therapy, showing results following introduction of vaccine therapy as the only new therapeutic measure. (Undiluted and unaltered vaccine was used in this group of cases.)

regards common colds in the experimental group as a whole compared with the control group. Individuals in the experimental group appear to have re-

The authors maintain that vaccine therapy should not displace other methods of therapy, such as control of neurogenic factors, proper diet and bowel

regulation discriminate use of antispasmodics, and in some cases changing of the bowel flora. Mild and moderate cases can often be controlled by these measures without the necessity of vaccine. However, in the more obstinate cases, autogenous vaccine in association with other measures has proved successful. The colon bacillus was the most frequently isolated organism and gave the most frequently positive and marked skin reactions. In a control series of normal cases 65 per cent showed sensitivity to one strain of the colon bacillus and 69 per cent to another strain, suggesting that the beneficial effect of vaccine therapy is nonspecific. However, a specific effect is suggested by the marked skin sensitivity to certain organisms in the irritable colon group, and the fact that the best results are obtained when systemic reactions are avoided.

COLITIS, CHRONIC ULCERATIVE.—TREATMENT.—The indications for and technic of ileostomy in chronic ulcerative colitis are described by J A Bargaen, P W Brown and F W Rankin (*Surg Gynec Obst* 55. 196 (Aug) 1932). To determine the present status of ileostomy in the treatment of this condition the authors have reviewed the 82 cases in which this operation was performed at The Mayo Clinic in the decade from 1921 to 1930. The data is outlined in Tables II, III and IV.

The authors' experience indicates that chronic ulcerative colitis is initiated in the large bowel, almost invariably, from the rectum upward. True, there are sporadic instances of markedly localized chronic ulcerative colitis, and other instances in which apparently it has been found in its earlier stages in the right and middle segments of the colon, but

for all practical purposes, it may be considered a disease which begins in the rectum and progresses toward the cecum and ileum. To attempt to make an anastomosis in a sigmoid which is infected with chronic ulcerative colitis is hazardous from the standpoint of immediate operative mortality, and there is little reason to believe that a high percentage of such patients would receive even transitory benefit from side-tracking the greater part of the large bowel by this method.

Their final conclusions are as follows:

1 Results from ileostomy in cases of chronic ulcerative colitis are satisfactory if the operation is performed for chronic complications.

2 Ileostomy should not be performed for uncomplicated chronic ulcerative colitis, unless all other measures of treatment have failed, these to include vaccine and serum.

3 Ileostomy should be performed only with the patient's full understanding of its nature as a life-saving measure.

4 Ileostomy for chronic ulcerative colitis should be permanent.

5 The most satisfactory type of permanent ileostomy is the one-barrel ileostomy, except in cases of stricture of the colon or when some hope for temporary ileostomy may be held out.

6 The education of the patient concerning the care of an artificial anus is an important factor for his happiness.

7 No one of the operations—appendicostomy, cecostomy, or ileosigmoidostomy—has proved a satisfactory therapeutic procedure for patients with chronic ulcerative colitis.

CARCINOMA.—Carcinoma affects the large intestine frequently, while the small intestine is infrequently involved. In the large intestine most carcinomas originate in the rectum and sigmoid.

TABLE II
DATA ACCORDING TO YEARS

	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	Total
New patients	49	46	57	63	102	134	154	189	197	202	1193
Ileostomies .	6	9	16	13	8	12	3	5	8	2	82
Deaths among patients not operated on	5	4	7	6	6	9	4	4	6	6	57

TABLE III
SURGICAL INDICATIONS AND MORTALITY ACCORDING TO GROUPS

		Cases	Mortality	
			Early	Late
Group 1	First fulminating attack and progressive failure	9	5	1
Group 2	Chronic, with acute exacerbation and progressive failure	21	8	1
Group 3	Chronic, with acute exacerbation and acute complications, as polyarthritis, stomatitis, erythema nodosum, and perirectal infection	8	5	2
Group 4	Chronic, not responding to medical treatment	28	7	9
Group 5	Chronic, with complications as polyposis, stricture, incontinent anus, carcinoma	13	1	2
Group 6	Chronic, with diagnostic difficulties Mass in left side of abdomen Lesion in right half of colon (tuberculosis or chronic ulcerative colitis) Lesion in right half of colon (tuberculosis or chronic ulcerative colitis)	3		
	Total	82	26	15

TABLE IV
KNOWN RESULTS IN 70 CASES (JANUARY, 1931) *

	Cases	Mortality	Late Results		
			Good	Fair	Poor
Group 1	9	6			2
Group 2	21	9	2		6
Group 3	8	7		1	
Group 4	28	17	1	1	9
Group 5	13	2	7		
Group 6	3				
Total	82	41	10	2	17

* Twelve of the questionnaires were not answered, but previous information had not been satisfactory concerning 7 and the 5 others were in fair condition.

ETIOLOGY.—According to W W Babcock (Delaware State M J 4 119 (June) 1932), the cause of the neoplasm usually is not evident. An hereditary predisposition, an age between 40 and 60 years, male sex, and those conditions which produce a chronic irritation of the colon and rectum, such as mucous, ulcerative or membranous colitis, polyps or adenomas, chronic constipation or dysentery, and diverticulitis predispose to the condition. Three per cent of the tumors in the author's series occurred below the age of 20, one patient being 13 years old.

SYMPTOMS.—The symptoms vary with the part of the bowel involved and with the type of carcinoma. In the rectum, ulcerating, papillary or fungating growths are usual, and produce diarrhea and bloody mucous stools. In the rectosigmoid, descending colon, splenic flexure and distal half of the transverse colon, small annular growths which cause constipation and intestinal obstruction predominate. In the cecum and ascending colon, large fungating or ulcerating, but not obstructing, lesions forming masses which may be seen or felt through the abdominal walls, are common. With the latter, intense anemia or ill-defined abdominal distress may be the first symptom. Large papillary growths may secrete quantities of mucus, the patient passing large amounts of a nearly clear but rather viscid fluid several times a day. The symptoms of carcinoma of the large bowel, therefore, vary greatly.

A patient in apparent health may suddenly develop *abdominal cramps, vomiting*, obstipation from an acute obstruction due to an annular carcinoma, or more often have progressively increasing *constipation*, that finally causes recurrent abdominal cramps, loud intes-

tinal noises, and hypertrophy or dilation of the bowel above the growth. The colicky pains may recur every 15 to 20 minutes and the distended intestinal coils, showing active peristalsis, be evident on inspection of the anterior abdominal wall. With the higher sites of occlusion, the obstructive symptoms are more violent and acute. It should be remembered that next to fecal impaction, the most frequent intraabdominal cause of chronic intestinal obstruction occurring during and after middle life is carcinoma of the colon. The ribbon stools described in the older textbooks are rare, but may occur with anal growths.

The *diarrhea* of rectal carcinoma has special diagnostic features. Very significant is an apparently causeless morning diarrhea, arousing the patient between 5 and 7 in the morning, with perhaps no abnormal movement after the patient has had breakfast. Rarely is this due to other causes than rectal cancer. Tenesmus indicates that the growth is close to the anus, while mucous stools suggest papillary overgrowth, or an irritation of the mucosa, offensive bloody stools show that ulceration is present. The peculiar fetid odor, due to decomposing blood and malignant tissue, is considered by some proctologists pathognomonic of cancer. The peculiar odor, however, is not to be expected with all papillary growths, or with cancer before the stage of necrosis and ulceration. Diarrhea is also characteristic of growths of the right half of the colon. As with cancer in many other parts of the body, pain is not a symptom. It results from complications such as ulceration, perforation, obstruction, or invasion of other organs. Obstruction, therefore, may cause pain and colic, the diarrhea of cancer in the

early stages may be free from pain and colic

Blood in the stools is usual with most of the growths of the left half of the colon, but often is not recognizable despite the progressive anemia in growths of the right colon. With cancer of the left colon, *cachexia* may be delayed for months or even 2 or 3 years.

DIAGNOSIS.—By the history alone, an accurate presumptive diagnosis may not infrequently be made of cancer of the large bowel, that it involves the rectum, sigmoid, or right colon, that it is a large papillary growth without ulceration, or a fungating, ulcerating tumor, or a small annular scirrhous growth. But, of course, the history should not be depended upon alone. A large proportion of the tumors are easily reached by a finger in the rectum and the majority of these may be accurately diagnosed by touch alone. The deep, ragged crater of the malignant ulcer, the craggy, raised, rolled and everted border, the infiltration into the wall of the bowel, are rarely mimicked by other pathological conditions. Growths somewhat above the reach of the finger may be inspected by the proctoscope or sigmoidoscope. Carcinomas in or above the sigmoid, of large size, may occasionally be felt through the abdominal wall, but a small annular growth may be difficult to locate even by the hand in the open abdomen.

In diagnosing the growths higher in the colon, an x-ray study after a barium meal or enema is invaluable. It does not compete with the examining finger, however, in diagnosing the lower rectal growths.

TREATMENT.—Cancer of the *colon* and *rectum* is particularly amenable to surgical extirpation. Better results, perhaps, follow radical opera-

tion than for malignancy of nearly any other internal organ. Certainly the results are better than for cancer of the stomach. Radiation by x-ray or radium has given so little benefit, that surgical removal is urged for all growths limited to the bowel and adjacent removable parts. With the results now to be obtained by operation, the routine palliative colostomy urged by a number of proctologists some years ago can no longer be sanctioned.

For cancer of the proximal two-thirds of the *colon*, a one- or two-stage, intraabdominal resection and anastomosis is the preferred operation, for growths of the *sigmoid* and *rectum* an abdomino-perineal excision by a single or multiple stage operation is to be preferred. The danger of the intraabdominal operation may be reduced by a previous proximal enterostomy, especially if there is obstruction, and perhaps also by the preliminary intraperitoneal injection of a vaccine, as used by Rankin and Bagen. For the sigmoid, a three-stage exteriorization operation of the Mikulicz type has of late years been popular, but a more thorough operation is not infrequently desirable.

Fortunately, the lymphatic diffusion from carcinoma of the large bowel is often slow, and metastasis to other organs may be long delayed. McVey estimates that at 7 months the lymphatics are involved in only 17 per cent; at 10 months, in 47 per cent, at 11 months, in 71 per cent. On an average, a growth that involves three-fourths of the circumference of the rectum has been present a year. This indicates the importance of an early diagnosis. Surely, with a disease so readily diagnosed, delay should not occur until ulceration and undue infiltration are present. Any gradual or abrupt

change in peristaltic habit in a patient after the age of 35 should be most carefully considered. Cancers occurring before the age of 35 are rarely curable. Before removing the involved segment of bowel, a careful examination for metastasis should be made, including an x-ray of the pelvis and spine, and, if possible, a careful intraperitoneal palpation for nodules in the liver, the aortic and pelvic lymph nodes and the peritoneum.

For cancer of the *rectal ampulla* and *lower sigmoid*, the tendency in recent years has been to abandon the perineal or Kraske type of operation and the perineal or sacral anus, and to substitute a two-stage operation, with an abdominal colostomy.

Technic.—After seeking for years for a satisfactory type of operation, Babcock (*Ibid*) has now largely abandoned colostomy, except as an emergency procedure, and adopted a one-stage abdomino-perineal extirpation, bringing the proximal end of the sigmoid to the perineum or into the normal anus. The author believes this has many advantages. The abdomen is opened and carefully explored for metastasis, after which the peritoneum forming the outer layer of the mesosigmoid is freely incised, the superior hemorrhoidal vessels divided between ligatures and the sigmoid and rectum freed to the floor of the pelvis in the conventional manner (Figs 1 and 2). A one-yard folded strip of iodoform gauze is now firmly tied around the bowel about 10 to 15 cm (4 to 6 inches) above the growth. This gauze is packed against the pelvic floor, and the liberated sigmoid and rectum laid upon it (Fig 3).

The abdomen is now carefully closed without drainage, without any attempt to cover the denuded area in the pelvis, or to form a pelvic diaphragm of peritoneum. Such a diaphragm which has routinely been used is, Babcock believes, entirely unnecessary and often harmful. A number of deaths have resulted from obstruction due to tension on the lower ileum or to herniation of a loop of bowel through the sutured peritoneal flaps. After the abdominal closure the patient is

immediately placed in the lithotomy position, a median incision made between the coccyx and anus through the pelvic floor, the strip of gauze grasped and pulled out with a large loop of bowel containing the tumor (Fig 4). From 30 to 80 cm of bowel may thus be withdrawn. Posteriorly and to the right, an iodoform gauze pack is introduced into the pelvis along the loop to guard against contamination. With the pack and an occlusive dressing in place, the loop of intestine is removed and a rectal tube tied in the proximal end.

At a later time, the end of the proximal loop may be connected with the anus if this has not previously been removed, or if the patient is in good condition, the proximal end of the bowel may be pulled through the thoroughly dilated or split anus. An esophageal bougie passed through the cleansed anus and tied into the proximal loop is useful for this purpose. If the growth, however, involves the lower part of the rectum and is highly malignant, a wide resection of the pelvic floor with removal of the anus is done.

Although, after testing by finger pressure, Babcock has even tied 1 or 2 of the sigmoid arteries as well as the superior hemorrhoidal, in order to remove a longer loop of bowel, rarely has he had the sloughing of the sigmoid, so common after the Kraske type of operation. With retention of the sphincter, control of the fecal movements is, of course, possible. With the sphincter removed, the warning sense of impending defecation is usually felt by the patient, and a pad held by a T-bandage gives a protection that compares well with the average colostomy apparatus. Babcock had one patient with the bowel pulled through a flap of the buttock with such good control that no pad was required. For the small and more superficial carcinomas of the lower rectum which show less malignant tendencies, a wide local resection of the tumor through the dilated or split anal opening is at times a very satisfactory operation, giving a perfect functional result. The author has observed several of these patients who had no recurrence for a number of years after the operation.

In about 30 cases these operations have given a mortality of about 10 per cent which may be reduced to nearly 3 per cent if deaths not directly due to the operation are eliminated.

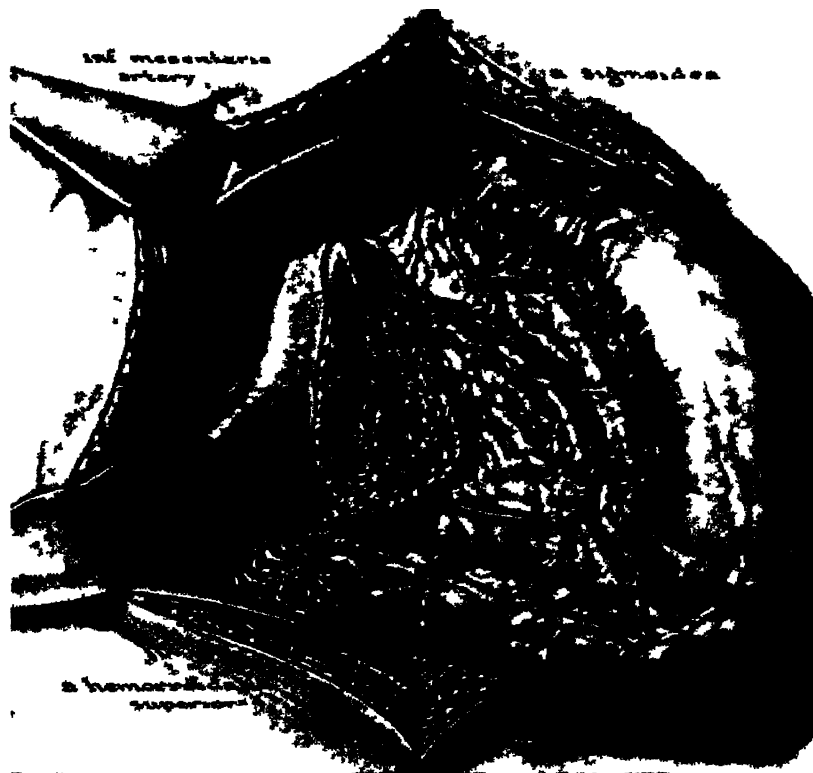


Fig 1—The abdomen has been opened by lower paramedian incision. The outer leaf of the sigmoid has been divided. The inferior mesenteric and superior hemorrhoidal arteries have been exposed by an incision through the peritoneum and ligatures have been applied preliminary to their division. The circulation to the sigmoid is maintained as the ligation is above the critical angle" (W W Babcock Surg Gynec Obst)



Fig 2—The sigmoid, rectum, attached mesenteric lymphatics, and fat have been freely liberated to the bottom of the pelvis. The mesosigmoid has been divided well above the carcinoma and a wide gauze tape tied about the bowel. No attempt is made to cover this large denuded area (W W Babcock Surg Gynec Obst)



Fig 3—The abdominal part of operation has been completed. The tape attached to sigmoid has been packed against the floor of the pelvis, the separated bowel laid upon it, and abdomen closed. Access for removal of liberated structures is obtained through the perineum. By a median perineal incision the tape has been located for withdrawal of tumor and connected structures (W W Babcock Surg Gynec Obst)



Fig 4—Tape with attached sigmoid has been withdrawn through perineal incision and eased through opening without traction (W W. Babcock Surg Gynec Obst)

HIRSCHSPRUNG'S DISEASE (MEGACOLON)—ETIOLOGY.—

The theories of etiology of megacolon have been summarized as follows by F W Rankin and J R Learmonth (Am J Surg 15 219 (Feb) 1932)

"(1) Congenital defects such as cause Hirschsprung's and Mya's disease, (2) obstructive processes, such as elongation of the mesentery, torsion of a segment, or multiplication of the intestinal loops; (3) anatomic factors, such as valve conditions, aplasia of the musculature just above the rectum, mechanical obstruction, and general systemic conditions; (4) infective processes, and (5) neurogenic processes" The fact that several cases have been relieved by lumbar sympathectomy indicates that some cases are undoubtedly due to derangement of the sympathetic nervous system The authors feel that the cause is often a mixture of several factors producing dilatation, elongation, and hypertrophy That some type of obstruction, either intrinsic, neurogenic, or mechanical, must be present "seems difficult to controvert"

Hirschsprung, in 1886, described the pathology of this condition as "a condition of congenital, high-grade dilatation of the colon with thickening of all its tunics, especially the tunica muscularis, and retention of large quantities of fecal matter" According to the authors, the dilatation and hypertrophy are limited to one segment in about one-half of the cases The sigmoid is affected in about 50 per cent of cases In segmental cases the line of demarcation is sharply defined, although the degree of hypertrophy and dilatation may vary in different segments A similar picture may be produced by actual obstruction in older persons from tumors of the rectum or sigmoid

TREATMENT.—It is generally accepted that there is a dual innervation of the rectum and anus, sympathetic and parasympathetic The latter nerve supply is derived from the inferior mesenteric plexus and probably acts as



Fig 5—Child, 3 years old, with typical appearance of megacolon (Rankin and Learmonth Am J Surg)

an inhibitor The sympathetic fibers are derived from the large ganglia in the abdomen, the celiac, semilunar and renal, and the paravertebral chains It has been shown that after cutting the sympathetic fibers, colonic activity is in-

creased in the dog. Various operations have been devised to produce this result in the human. Rankin and Learmonth (*Ibid*) first section the presacral nerve, then divide the inhibitory nerves along

control by motor nerves, and relieves any partial obstruction due to internal sphincter spasm. These results are accomplished in the first 2 instances by division of the inferior mesenteric

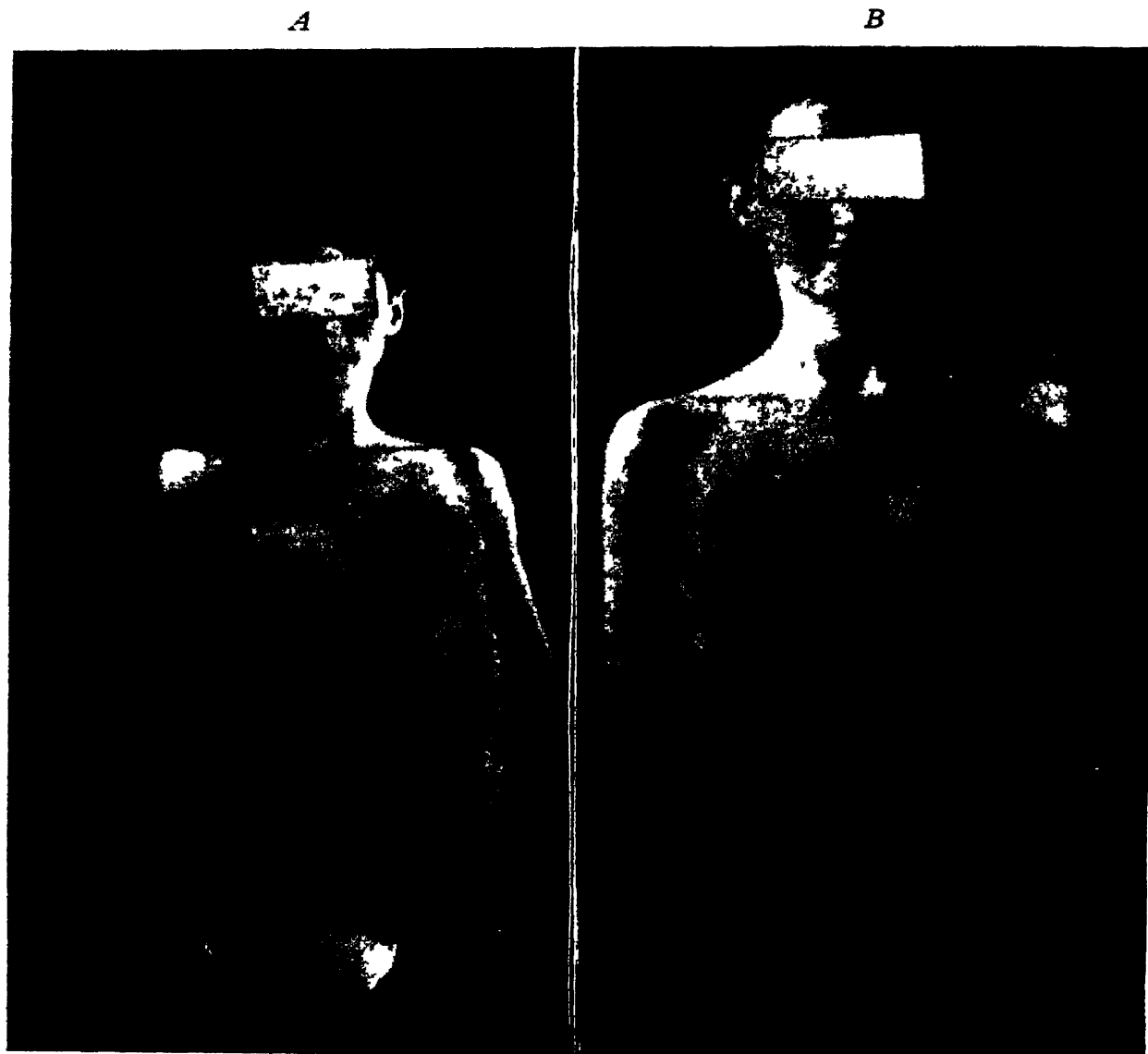


Fig 6—*A*, Megacolon in 16-year-old girl, before treatment, *B*, same patient after medical decompression (refused operation) (Rankin and Learmonth *Am J Surg*)

the inferior mesenteric artery, thereby severing all the sympathetic nerves to the parts of the bowel chiefly affected.

Eight cases are reported by the authors, showing the efficacy of this type of surgical treatment. They believe this procedure diminishes the dilatation of the colon, overcomes the excessive

nerves, and in the third by division of the presacral nerves.

L. Sheldon, R. A. Kern and E. G. Hakansson (*Am J M Sc* 184:94 (July) 1932) have reported 3 cases of megacolon treated by parathormone. Although the effect of parathyroid disease on the gastrointestinal tract has

been noted by other workers, no special attention has been paid to the effect on the colon. The most widely accepted theory of the etiology of megacolon is that of neuromuscular dysfunction in which spasms in the sphincteric regions (rectal, pelvi-rectal) are followed by dilatation proximal to the spastic areas. Ramisection or lumbar sympathetic ganglionectomy and ramisection have been suggested as possible methods of treatment. That the muscle is not atrophic, but hypertrophic, has been demonstrated by Judd and Adson, and Scott and Morton by the administration of spinal anesthesia. This procedure is followed in minutes by contraction of the bowel. In the authors' cases response was obtained by the hypodermic injection of parathormone, 20 to 40 units daily. In 1 case a tremendously dilated colon was reduced to practically normal size in 8 days, according to x-ray findings.

SURGERY OF COLON.—COLLECTOMY.—*Indications and Technic.*—F W Rankin (Ann Surg. 94:677 (Oct) 1931) discusses the indications and technic of total colectomy. The files of The Mayo Clinic contain records of 16 cases of total or subtotal removal of the colon. Since the indications are assumed to have been similar in all, Rankin has divided these arbitrarily into 2 groups, according to the amount of bowel removed. He uses the term "subtotal colectomy" to designate removal of the colon down to, or almost to, the juncture of the sigmoid with the rectum, and the term "total colectomy" to indicate complete exeresis of the colon, sigmoid, and rectum. He states that such a formidable procedure as extirpation of the entire colon and rectum should be undertaken only in the presence of very definite indications.

There are 2 general types of conditions which call for total colectomy: a definite primary lesion, and a secondary lesion. The primary lesion is *poly-poidosis*. Anatomically and pathologically, polyps in the colon are of 2 main types. Those of one type are true neoplasms and those of the other type, the results of an inflammatory reaction. The polyps are divided into 3 distinct groups, which vary grossly as well as microscopically.

In those of Group I, the epithelial elements are practically normal; the tumors are rough nodules on the mucous surface of the bowel, varying from tiny clubs to masses 2 cm on section. Polyps of this type rarely become malignant.

The polyps of Group II are easily distinguished from those of Group I, as the structural changes in both the epithelium and connective tissue elements are abrupt and very striking. Rankin believes that the rate of development of the carcinoma in polyps is an extremely important factor in their metamorphosis.

In polyps of Group III the epithelium is almost completely undifferentiated. It is an accentuated form of that seen in the polyps of Group II. These polyps early become deep, infiltrating carcinomata.

The *diagnosis* of *congenital poly-poidosis* is usually made by digital or proctoscopic examination, because the polyps invade the rectum as well as the entire colon and are both palpable and visible.

The second indication for total colectomy is complicated *chronic ulcerative colitis* producing either multiple lesions of the joints as a focus of infection, or resulting in multiple polyps which not infrequently change into malignant growths.

In extirpation of the entire colon, 2 procedures are available (1) an operation in 3 stages, consisting of ileostomy, removal of the colon down to the rectosigmoid juncture, and combined abdomino-perineal resection of the rectum, and (2) ileosigmoidostomy followed by colectomy.

In Rankin's 6 cases, total colectomy was done in 3 stages without an operative death

CONCEPTION. — The *time of conception*, as a rule, lasts 8 days, according to K Ogino (Zentralbl f. Gynak 56 721 (Mar 19) 1932), extending from the nineteenth to the twelfth day before the succeeding menstruation. In the time between the twenty-fourth and twentieth day before the next menstruation, a conception is extremely rare, but there are as yet not sufficient observations to exclude the possibility of a conception during these 4 days; because of the rarity of conception during this period, however, it can be considered as practically sterile. During the 11 days before the onset of the next menstruation, however, conception is impossible.

The author believes that the determination of these factors will enable women who have to practice sexual abstinence or resort to contraceptives to do without these at least during some periods. For practical purposes, it is advisable to determine the period of conception from the onset of the last menstruation. If the cycle lasts 28 days, the time of conception is between the tenth and seventeenth day after the onset of the first day of the menstruation. If the cycle is longer or shorter than 28 days, the term of conception is shifted by so many days backward or forward.

Since there are comparatively few women in whom the menstrual cycle is always of the same duration, the formula for the time of conception has to be expressed as follows: beginning of term of conception is 10 plus (minimal duration of cycle minus 28 days). End of term of conception is 17 plus (maximal cycle minus 28 days). The maximal and minimal duration of the cycles have to be determined from the last 12 series of cycles, to take into account only 3 or 4 cycles is not sufficient. However, since most women do not keep a record of their menstrual cycles, they have to give the maximal and minimal duration from memory. The formula mentioned is of value only for women in whom the menstrual cycle has a maximal fluctuation of not more than 10 days. The greater the fluctuations, the less the value of the formula.

CONJUNCTIVA. — ARGYROSIS. — *Treatment* — A freshly prepared mixture of 2 parts of 2 per cent potassium ferrocyanide and 1 part of 12 per cent sodium thiosulphate, as described and used by Weymann, was employed by I S Tassman (Am J Ophth 14.55 (Jan) 1931) in cases of argyrosis of the conjunctiva. Subconjunctival injection of this mixture is followed by marked clearing of the discolored conjunctiva.

BLEPHAROCONJUNCTIVITIS. — *Treatment.* — A Corrado (Letture oftal 8 82 (Feb) 1931) obtains good results in ulcerative and squamous blepharitis, in conjunctivitis and in septic corneal ulcers, from the use of a pomade of iodol. This may be placed in the conjunctival sac or externally. He recommends the following formula: iodol 0.30, lanolin 6.0, ophthalmic vaseline 24.0.

BURNS —Treatment.—The use of a small burr for the removal of all oxidized tissue in ocular injuries is recommended by G H Cross (Arch Ophth 7 357 (Mar) 1932) For burns produced by *caustic soda* immediate application of officinal glycerite of tannic acid solution is effective

MEIBOMIANITIS.—Etiology and Treatment.—R D Dovbush (Sovet vestnik oftal 1 206, 1932) believes that dysfunction of the Meibomian glands is responsible for obstinate conjunctival and corneal lesions He recommends in these cases repeated massage of the eyelid, with subsequent application of ether to the intermarginal space

PIGMENTATION.—Etiology.—A Pillat (Arch f Ophth 128 201, 1932) reports that adults subjected for a long time to a diet deficient in vitamin A develop a clinically visible neoformation of pigment in all parts of the conjunctiva

PTERYGIUM.—Treatment.—To guarantee against recurrence, P Mata (Arch de oftal Hispano-am 31 177 (Mar) 1931) recommends excision of the pterygium and transplantation of buccal mucosa carefully sutured to the conjunctiva with (6 to 8) silk sutures

In the treatment of pterygium M F C Zubak (Arch Ophth 5 732 (May) 1931) has obtained good results from the use of electrocoagulation, employing a machine which is designed for electrocoagulation, fulguration, etc The entire pterygium is not coagulated at one visit

A case of syphilitic lymphomatosis of the conjunctiva in an adult male is reported by J Francois (Arch d'ophth 49 91 (Feb) 1932) The patient presented anal mucous plaques and had a strongly positive Wassermann reaction The

tumor mass disappeared after 2 months' treatment with *salvarsan*.

TUBERCULOSIS.—Two cases of tuberculosis of the conjunctiva are reported by S Jordan (Ztschr f. Augenh 76 147 (Jan) 1932) One, he believes, was due to hematogenous metastasis, because tuberculous lesions were found in the lungs and in the retina The other case, however, associated with no demonstrable tuberculous lesions and its recurrence was, therefore, considered an exogenous reinfection

TUMOR.—A case of corneoscleral *dermoid tumor* in a guinea-pig is reported by E Chan (Am J Ophth 15 525 (June) 1932) He points out, that according to Fuchs, 'dermoid tumors should not be confounded with dermoid cysts In dermoid cysts the cutis is outside, the epidermis inside, in the dermoid tumor the layers have their normal arrangement, the epidermis being outside and the cutis with the subcutaneous fat lying within'

CONJUNCTIVITIS.—ACUTE.—**Treatment**—According to H. J. Howard (J Missouri M. A 29:193 (May) 1932), most acute infections of the conjunctiva are due to the pneumococcus or the Koch-Weeks bacillus, the incubation periods of which are about 24 hours. Smears taken on the fourth day after onset or later show no evidence of the primary invading organisms although the symptoms persist Howard, therefore, believes that the local treatment in acute conjunctivitis is too severe and particularly too long continued He finds that **normal saline** or **boric acid irrigations** are more efficacious than antiseptic solutions In gonorrheal conjunctivitis the bacteria may persist for several weeks. He points out that unless the organisms are

found in epithelial cells in stained specimens, they do not necessarily establish the diagnosis

ANGULAR.—Treatment.—O P Bourbon (Am J Ophth 15 546 (June) 1932) directs attention to the fact that the secretion in angular conjunctivitis is not only scanty but stringy. He recommends zinc sulphate in solutions and zinc ionization to shorten the duration of the disease. Zinc ionization is given daily or on alternate days as follows: 2 drops of zinc sulphate are instilled in each eye; 2 absorbent cotton pads moistened with a 1 or 2 per cent solution of zinc sulphate are placed over the eyes, a double zinc electrode which is attached to the positive pole of a galvanic current is placed on the pads, while the negative electrode is placed over the nape of the neck. A current of 2 or 3 milliamperes is then applied for 10 minutes.

PARINAUD'S DISEASE.—Etiology.—J Longchamp and J. Reboul (Arch d'opht 49 88 (Feb) 1932) report 4 cases of Parinaud's conjunctivitis found in patients who had been in contact with animals. They believe that a filtrable virus may be responsible for this disease.

GRANULAR.—Varieties.—D Cataneo (Rev internat du trachôme 9:1 (Jan) 1932) reports that he found only 16 cases of *unilateral* trachoma among 1600 cases of that disease. Examination with the slit-lamp and corneal microscope usually revealed trachoma in a mild form in the apparently normal eye.

In 2 cases of *monocular* trachoma, D Michail and P Vancea (*Ibid* 9:33 (Jan) 1932) inoculated the healthy eye with scrapings from the diseased eye but no infection occurred. When they inoculated the normal conjunctiva of 2 blind persons with this same material no infection occurred. Scrapings from

typical cases of bilateral trachoma, however, readily produced infection. They suggest that monocular trachoma may be a separate disease which simulates trachoma.

Etiology.—According to T Baldanzellu (Arch di Ottal 38 621 (Dec) 1931), trachomatous nodules and papillary hypertrophies in the conjunctiva are closely related if not identical with toxico-infective tuberculous granules in their development, cause and final results. He found active pulmonary involvement, progressive infectious processes, tuberculous allergy, and toxic involvements in 100 cases of granular conjunctivitis in varying stages of activity.

F I Proctor, W C Finnoff and P Thygeson (Am J Ophth 15 206 (Mar) 1932) obtained negative results after repeated attempts to inoculate the conjunctivæ of a blind volunteer and of a *Macacus rhesus* monkey with strains of *B granulosis*. They believe that the bacteria had lost their virulence from repeated culture.

P. Thygeson (*Ibid* 15 293 (Apr) 1932), however, produced in 5 monkeys a folliculosis of the conjunctiva which yielded *B granulosis*. He found that the disease differs from human trachoma mainly in the absence of pannus. The normal conjunctiva of the *Macacus rhesus* monkey differs from the normal human conjunctiva in the virtual absence of the adenoid layer and appears to be markedly resistant to infection with human trachomatous materials. Thygeson concludes, as a result of these experiments, that the etiologic relationship between this organism and human trachoma can never be established by experimentation on monkeys. He gives a résumé of results obtained by other students of trachoma.

C Pascheff (*Ibid* 15 690 (Aug) 1932) discusses follicular diseases of the conjunctiva and their relation to true trachoma. The conjunctiva, like any other lymphatic tissue, reacts to many agents by the formation of follicles of 3 principal, clinical forms (1) conjunctivitis follicularis simplex, (2) conjunctivitis follicularis miliaris, and (3) conjunctivitis follicularis confluens or folliculomatosa.

1 *Conjunctivitis follicularis simplex* is the most frequently encountered form and is observed in children and in young adults. The follicles which appear in the fornices, histologically are lymphocytic infiltrations. The lymphoblastic and endothelioid germinative centers are usually absent or poorly developed. The follicles disappear without leaving scars or other traces of their former existence. As in simple adenitis, this type of conjunctivitis may be chronic but disappears completely.

2 *Conjunctivitis (or ophthalmia) follicularis miliaris* was first described by Pascheff in 1916. It consists of a thick follicular rose-red membrane due to dissemination of the follicles in the scleral conjunctiva and in the cornea. These tissues are infiltrated not only with lymphocytes, but with abundant follicles presenting evident germinating centers as their chief histologic characteristic. This type results in cicatrization and xerophthalmos.

3 *Conjunctivitis (hyperplastica) follicularis confluens* or *folliculomatosa* runs a chronic course and develops characteristically in the most vascularized regions of the conjunctiva, *i.e.*, in the fornices and at the limbus.

Trachoma is not a mere lymphocytic infiltration, but a lymphadenoid vegetation, which grows even on the cornea, where there are normally no vessels.

Pascheff believes that this corneal manifestation is the best argument for the lymphatic nature of trachoma. He formulates 4 laws of trachoma: (1) there is no trachoma without follicles, (2) the trachoma follicle is a confluent follicle, (3) the folliculoma of trachoma can develop on the cornea, as well as on the conjunctiva; (4) true trachoma, like every lymphadenoid tissue, finally passes into spontaneous cicatrization or hyaline degeneration. He describes cases in families to show the hereditary tendency of trachoma and of the accompanying evidences of lymphatic disturbances. Pascheff concludes that trachoma is an endogenous, constitutional lymphadenoid disease of the conjunctiva, not an inflammatory lymphocytic infiltration in which follicular manifestations are accidental.

Diagnosis.—From his study of the trachomatous intradermal reaction of Tricoire, based on 511 cases, R Belot (Rev internat du trachôme 8 225 (Oct) 1931) concludes that the test has no practical value. He believes that trachoma is essentially a local disease.

Treatment.—Satisfactory results were obtained by J Neumann (Brit J. Ophth. 15 518 (Sept) 1931) during the past 4½ years in 58 cases of trachoma treated with 10 per cent tincture of iodine. Pannus and ulcers were present in all cases. The following technic is recommended. Evert the eyelids, dry the conjunctiva, and apply a 10 per cent tincture of iodine with a cotton-tipped glass rod; allow the iodine to dry and remove the excess with a dry piece of cotton; then apply a nonirritating ointment to the parts. Repeat in 4 to 7 days and during the interval massage the lesion.

Good results in the treatment of trachoma and purulent conjunctivitis by the

use of nascent silver iodide were obtained by J Sédan (*Ann d'ocul* 169 137 (Feb) 1932) Two solutions, one of potassium iodide (3.32 Gm—50 grains—to 10 cc— $2\frac{1}{2}$ drams—distilled water), and the other of silver nitrate (3.56 Gm—54 grains—to 10 cc— $2\frac{1}{2}$ drams—distilled water) are mixed, resulting in the production of nascent silver iodide, which can be applied to the lower culdesac for treatment of the diseased conjunctiva

E Stastnik (*Oft Sbornik*, 6 258, 1931) reports good results in the treatment of trachoma with copper thiosulphate, 0.2 Gm (3 grains) copper sulphate to 2 Gm (30 grains) of sodium thiosulphate administered intravenously The dose is usually repeated every fifth day

Trachosan, a salve containing 0.5 per cent copper, is recommended by F Wulkow (*Klin Monatsbl f Augenh* 88 666 (May) 1932) for the treatment of trachoma and follicular catarrh He claims that it is harmless and does not irritate the eye

N. Fehmi (*Rev internat du trachôme* 9 44 (Jan) 1932) used tuberculin therapy for trachoma with pannus in the case of a boy, aged 15 years After 3 months, the patient's general and local condition improved remarkably, although no local treatment had been employed

M Harston (*Brit J Ophth* 15 717 (Dec) 1931) reports successful results in 200 cases of trachoma treated by the ultraviolet ray. He prefers the use of the open-tungsten-arc rather than the mercury vapor lamp The patient is seated opposite the lamp at a distance of 3 feet, a drop of 1 per cent epinephrine solution is instilled in each eye to prevent congestion, and the eyelids are kept gently closed during the treatment

In 3 cases of trachoma reported by B G Towbin (*Arch f Ophth* 125 643, 1931), mucous membrane transplants showed assimilation with the surrounding trachomatous conjunctiva after 6 to 18 months In these cases the transplanted mucous membrane had succumbed to trachomatous disease

VERNAL.—Complications.—M N Beigelman (*Am J Ophth* 15 95 (Feb) 1932) states that in vernal catarrh, corneal involvement is a frequent complication, although it rarely results in impairment of the visual functions Beigelman attempts to establish the place of this complication, on one side, among the degenerative lesions of the corneal epithelium, and, on the other side, among the corneal dystrophies occurring as a complication of vernal catarrh In 2 cases of vernal catarrh a dystrophy of the corneal epithelium was observed, a histopathologic examination having been performed in one of the cases

CORNEA.—DYSTROPHY.—

Treatment — In discussing the mild form of epithelial dystrophy of the cornea, S R Gifford (*Arch Ophth* 7 18 (Jan) 1932) states that the usual complaints are a scratchy feeling of the eyes and loss of vision With a +10.00 D sphere in the ophthalmoscope, a number of fine black dots are seen against the red fundus reflex With the slit-lamp 500 to 600 minute areas and numerous tiny blebs may be seen in the epithelium after staining the cornea with fluorescein Punctate white dots and endothelial droplets are numerous Corneal sensitivity is lost Ethyl morphine hydrochlorate, in a 2.5 to 5 per cent solution, combined with a cyanide of mercury solution yields good results in the mild form Phenacaine acts not

only as an anesthetic, but also as a stimulant to the corneal epithelium

INFECTION.—K vom Hofe and W Krantz (Arch f Augenh 105 721 (May) 1932) conclude that an infection with the *Spirocheta pallida* results in a lowering of the local resistance of the cornea. This conclusion is based on their experiments with horse serum injected into the cornea of rabbits previously infected with syphilis and in the cornea of normal nonsyphilitic rabbits.

KERATITIS, PHLYCTENULAR.

—**Pathogenesis.**—W Riehm (*Ibid* 105 55 (Oct) 1931) concludes from his experimental study of the pathogenesis of phlyctenular keratitis that a real anaphylactic condition exists in this disease. Acute and recurrent attacks result from the liberation of bacilli from tuberculous gland processes into the circulation. The bacilli disintegrate in the tissue and set free a tuberculous antigen which produces the inflammation as an anaphylactic reaction. The eye possesses a selective sensibility, especially when the effectiveness of the antibodies is reduced by conjunctivitis or general diseases.

Etiology.—Eighty-five per cent of children with phlyctenular keratoconjunctivitis have a positive cutireaction, according to P Woringer (Paris méd 2 398 (Nov 7) 1931). Two-thirds of the cases with a recently positive cutireaction showed developing hilus lesions revealed by x-ray.

KERATOPLASTY.—R Castroviejo (Am J Ophth 15 905 (Oct) 1932) reports the results of his method of keratoplasty on the normal corneas of 40 rabbits showing that 35 per cent of the transplants were successful and remained histologically and clinically in normal condition. He finds that small irregularities in the edges of the in-

cision of the section interfere with good healing, rectangularly fashioned transplants are best for obtaining leveling of both the transplant and the cornea of the host, not only for adapting and nourishing the transplant, but to prevent its falling into the anterior chamber. Conjunctival flaps are essential, the transplant should be passed directly from donor to host and conjunctival sutures should be removed on the fourth day. Heterotransplants invariably become opaque. He feels certain that the substitution of transparent corneal flaps for opaque areas is no longer impossible.

ULCER HYPOPYON — Treatment.—E Delord (Ann d'ocul 169 379 (May) 1932) has cured 12 cases of corneal ulcers with hypopyon by fistulization of the center of the cornea with the heated end of a strabismus hook. He perforates the cornea and maintains the fistulous opening for about 3 days by daily cauterizations. The fistula usually persists until the tenth day. Within 25 days cure is complete and the leukoma begins to clear. Synechiæ occurred in many cases and glaucoma in two. In the other cases vision varied from $\frac{1}{50}$ to $\frac{1}{20}$. By optical iridectomy 1 case was improved to vision 0.3.

ULCERS. — Treatment.—Good results were obtained by E Klauber (Klin Monatsbl f Augenh 88 225 (Feb) 1932) in 5 cases with ulcerations and infiltrations of the cornea by treatment with 5 per cent gold chloride solution.

The use of *ultraviolet rays* in the neighborhood of 2800 Å U. is recommended by H R Hildreth (Am J Ophth 15 925 (Oct) 1932) for the treatment of ulcers of the cornea. These rays have a favorable effect on

the course of corneal ulcers and bring about healing with a minimum of scar formation. Ultraviolet light occupies that part of the spectrum immediately below visible light, at wave lengths between 4000 Å U and 2000 Å U. Hildreth discusses the action of this radiant energy on (1) the skin, in which a delayed onset of erythema occurs followed by increased pigmentation, (2) the blood which comes from the irradiated skin, this blood possesses an increased nonspecific bactericidal power, (3) the bones, preventing and curing rickets, (4) the cornea, the epithelium of which shows the greatest change of all its layers. Basophilic and eosinophilic granules always appear in the cells. This process results in death of these cells when the irradiation has been sufficient.

When treating the eye with ultraviolet light, all infrared energy should be filtered out. How ultraviolet energy influences the living tissue is not clearly understood. Absorption of a lethal amount of ultraviolet energy results in the destruction of the individual cells. Sublethal exposure probably alters the electrical pattern of the atomic systems of the cellular element. Irradiation induces hyperemia, with improvement in nutrition, local migration of eosinophilic cells, and sloughing of the superficial cells with the bacteria they contain. All inflammations of the external parts of the eye react favorably to ultraviolet therapy.

CONVULSIONS IN CHILDREN.—FREQUENCY.—Of the 22,036 admissions to the Milwaukee Children's Hospital during the past 9 years, M. G. Peterman (J. A. M. A. 99:546 (Aug. 13) 1932) states that 419, or 1.9 per cent. of the total, were

admitted to the hospital because of convulsions.

ETIOLOGY.—According to W. Evans (Australia M. J. 2:229 (Aug. 22) 1931), convulsions may be excited by mechanical, vascular, or physico-chemical factors. In epilepsy, however, there is an inherent liability on the part of the grey matter of the cerebral nervous system to react by a convulsion even to milder stimuli, and the "convulsive threshold" of the individual varies within wide limits.

The mechanical convulsions are due to an increase in the amount and pressure of the cerebrospinal fluid.

Concerning vascular causes, the author states it has recently been established that the cerebral and pial blood-vessels contain vasomotor nerve fibers and in some cases of convulsions the sympathetic nervous system acting on the cerebral blood-vessels undoubtedly plays a large part.

In regard to *humoral* and physico-chemical causes, the author states the hypothesis has been established that alkalosis, anoxemia, and excessive hydration definitely predispose to epileptiform convulsions.

Calcium.—According to J. B. Rennie (Glasgow M. J. 117:133 (Mar.) 1932) the total serum calcium and diffusible calcium are reduced not only in cases with clinical signs of tetany, but in many cases of convulsions with no other evidence of this syndrome. The serum-protein influences only the protein-bound calcium, which is inert as far as neuromuscular excitability is concerned. The injection of *amino-acids* intravenously in animals causes a definite fall in the serum calcium. From these results the author states it seems fair to conclude that the products of protein decomposition, certainly those in the form

of amino-acids, can combine with calcium, remove it from the serum, and thus induce hypocalcemia

Hypoglycemia.—According to J Baumhauer (J M A Alabama 1 312 (Feb) 1932), symptoms of convulsions appear in some individuals when the blood sugar is between 40 and 50 mg per 100 cc of blood Hypoglycemia may result from definite pathologic changes. These fall into 3 etiologic groups hepatic, endocrinal and pancreatic Hypoglycemia of *hepatic origin* is due to disturbances either in the sugar metabolism or in the storage function of the liver A lowered sugar content of the blood occurs with parenchymatous changes in the liver caused by such substances as chloroform, arsphenamine, phosphorus, etc Hypoglycemia, according to the author, frequently occurs with certain abnormalities of the *endocrines*, *ie*, pituitary, thyroid and suprarenals Suprarenal and pituitary extracts will raise the blood-pressure, which suggests that these glands may be causal factors in lowered blood sugar Also, a lowered blood sugar has been noted to follow subtotal thyroidectomy Hypoglycemia induced by the injection of insulin is well known; certain tumors of the *pancreas* have been reported as a cause of hypoglycemia

CLASSIFICATION—E H M Stephens (Australia M J 2 231 (Aug 22) 1931) has classified convulsions according to etiology

- (A) Those of intracranial origin
 - (a) Neonatal intracranial hemorrhage
 - (b) Acute intracranial disease, such as meningitis
 - (c) Chronic intracranial disease, such as brain tumor and cerebral abscess, hydrocephalus, and microcephaly, serious cerebral maldevelopment, such as that seen in certain cerebral diplegias

- (d) Convulsions occurring in the course of polioencephalitis
- (e) Those seen in lead encephalopathy
- (f) Convulsions in syphilis
- (g) Intracranial hemorrhage occurring in scurvy
- (B) The extracranial group provides the majority of cases met with in general practice
 - (a) Tetany or spasmophilia is often the agent without which intestinal worm and other irritants would fail to excite convulsions
 - (b) Those due to dentition.
 - (c) Those due to some digestive disorder or dietetic indiscretion
 - (d) Those whose exciting cause is round worms or perhaps occasionally thread worms
 - (e) Those that usher in some exanthem
 - (f) Those excited by acute inflammation of the ear or by foreign body in the external canal
 - (g) Those seen in severe pertussis and in pneumonia some days after the onset, indicating degrees of asphyxia
 - (h) Those that mark the end for the wasted sufferer from gastroenteritis, in a condition of acidosis
 - (i) Those symptomatic of hypoglycemia.
 - (j) Those seen in acute nephritis

Age Periods.—M G Peterman (*loc cit*), in his study of convulsions, has analyzed and classified the courses of convulsions according to the different age periods:

NEWBORN (TO 1 MONTH)		
Diagnosis		Number
Cerebral birth injury	..	3
Acute infection	.	4
Total	.	7

While the series is small, the findings coincide essentially with those of larger groups in that cerebral birth trauma is a most common cause of convulsions during this period

INFANTS, 1 TO 6 MONTHS

Diagnosis	Number	Per Cent
Acute infections	18	33.3
Cerebral birth injury	10	18.5
Spasmophilia	9	16.6
Gastroenteritis	3	5.6
Hydrocephalus	2	3.7
Meningitis (meningococcus)	1	1.9
Unknown	11	20.4
Total	54	100.0

Peterman points out that, contrary to many authors, convulsions are not infrequent in this period, which constituted 12.9 per cent of the series.

It is of interest to note that in this group spasmophilia is responsible for 9 cases or 16.6 per cent. The age incidence of spasmophilia or tetany is usually stated to range between 6 months and 2 years. However, cases of tetany have been reported in the newborn by M. H. Bass and S. Karelitz (J. A. M. A. 97:1372 (Nov. 7) 1931), W. R. Shannon (Arch. Pediat. 46:549 (Sept.) 1929), *Ibid.* 48:153 (Mar.) 1931), E. G. McGavran (J. A. M. A. 99:115 (July 9) 1932).

In making a *diagnosis* of tetany in the newborn, considerable significance has been attached to the presence of a positive *Chvostek's sign*. A. G. Mitchell and F. E. Stevenson (J. A. M. A. 99:1502 (Oct. 29) 1932) pointed out that the Chvostek sign is often positive in newborn infants even in the presence of normal blood calcium and normal electrical reactions. It was emphasized that a diagnosis of tetany during this age period requires proof of a lowered blood calcium or of the characteristic electrical reactions. More recently, H. T. Nesbit (Am. J. Dis. Child. 44:287 (Aug.) 1932) has reported a tetany-like syndrome occurring in 6 infants during the neonatal period. The author concludes that the syndrome is apparently the re-

sult of qualitative, rather than a quantitative, diminution of the serum calcium. From the improvement observed to follow the administration of parathyroid extract, he thinks it very likely that this clinical entity is dependent on a condition of hypoparathyroidism.

INFANTS FROM 6 TO 36 MONTHS

Diagnosis	Number	Per Cent
Acute infection	52	35.3
Spasmophilia	51	34.7
Cerebral birth injury residue	17	11.5
Epilepsy (idiopathic)	10	6.7
Brain injury (traumatic)	2	1.4
Meningitis (meningococcus)	2	1.4
Hydrocephalus	2	1.4
Pertussis, sequel (intracranial hemorrhage)	1	0.7
Gastroenteritis	1	0.7
Acute encephalitis (measles)	1	0.7
Encephalitis residue	1	0.7
Intracranial vascular lesion	1	0.7
Unknown	6	4.1
Total	147	100.0

This period has the highest incidence of convulsions (147 cases, or 33.3 per cent) of the series. The acute infections, particularly the onset of acute infectious diseases, are the most frequent causes of convulsions at this age. In this period, spasmophilia or tetany constitutes an almost equal number.

FROM 3 TO 10 YEARS

Diagnosis	Number	Per Cent
Epilepsy (idiopathic)	81	57.0
Cerebral birth injury residues	18	12.7
Acute infections	15	10.6
Tetanus	4	2.8
Residue brain injury (accidental)	2	1.4
Encephalitis, residue	2	1.4
Gastroenteritis	2	1.4
Jacksonian epilepsy (no evidence of injury, infection, or tumor)	2	1.4
Polioencephalitis (Strumpell-Marie)	2	1.4

Diagnosis	Number	Per Cent
Spasmophilia	1	07
Meningitis	1	07
Brain tumor	1	07
Meningovascular, syphilis congenita	1	07
Hydrocephalus, congenital	1	07
Congenital cerebral defect	1	07
Unknown	8	57
Total	142	100 0

This is the second largest group of cases (142 cases, or 34 per cent) Epilepsy is responsible for the majority of these cases of convulsions

FROM 10 TO 15 YEARS

Diagnosis	Number	Per Cent
Epilepsy (idiopathic)	50	72 5
Cerebral birth injury residues	6	8 8
Congenital brain defect	2	2 9
Tetanus	2	2 9
Acute infection	2	2 9
Jacksonian epilepsy (no evidence of injury, infection, or tumor)	1	1 4
Residue brain injury (traumatic)	1	1 4
Congenital syphilis	1	1 4
Chronic encephalitis	1	1 4
Unknown	3	4 4
Total	69	100 0

This group of 69 children (6 4 per cent of the series) differs from the preceding one in the lower incidence of cerebral birth injury residues Idiopathic epilepsy is responsible for 50 cases

ENTIRE SERIES

Diagnosis	Number	Per Cent
Epilepsy (idiopathic)	144	34 4
Acute infections	90	21 4
Spasmophilia or tetany	67	16 0
Cerebral birth injury or residue	55	13 1
Cause unknown	28	6 7
Miscellaneous	35	8 4
Total	419	100 0

For the entire group, *epilepsy* was the most frequent single cause of convul-

sions According to W Evans (*loc cit*), the Jacksonian conception that there are 3 physiologic levels in the central nervous system has been adopted as the basis of the classification of epileptic seizures The highest level is situated in the frontal lobes, the middle in the Rolandic and associated areas, and the lowest in the frontobulbar region

Convulsions arising from the highest level are characterized by auræ or by purposive and coordinate movements as opposed to the spasmodic and incoordinate muscular contractions arising from the lower centers

Middle level convulsions are usually described as Jacksonian and in their typical form are localized in coordinate muscular contractions referable to the Rolandic area

Lowest level pits are characterized by tonic contractions—the clonic element is lacking, it originates in the cortex Convulsions at this level may also develop in the striatal region, and then give rise to torsion spasm associated with athetoid movements and Parkinsonian signs

Convulsions arising in the cerebellum are characterized, according to the author, by head retraction and opisthotonos These, which have their origin in the neighborhood of the fourth ventricle and the adjoining nucleus of the vagus nerve, are interesting From here arise the so-called visceral epilepsies, associated with epigastric, cardiac or vasovagal symptoms, such as oppression or fulness in the epigastrium, nausea, palpitation and pseudoangina, or sweating and faintness

DIAGNOSIS.—A diagnosis was established in 93 3 per cent of the 419 cases of convulsions studied by Peterman (*loc cit*). The study of the patients included a complete history, a

careful physical examination, including neurologic studies, a blood count, a Wassermann test of the blood and microprecipitation tests, urinalysis, examination of the spinal fluid (except in spasmophilia), examination of the fundi, x-rays of the skull and examination of the stools. In recent years, encephalograms were made in doubtful cases.

PROGNOSIS.—According to Peterman, every convulsion produces a certain amount of cerebral injury and, therefore, lowers the threshold for subsequent seizures. There is no justification whatever in minimizing the symptom because of the age or in informing parents that time will remove the cause.

TREATMENT.—Peterman (*loc cit*) states that the simplest, quickest and most effective treatment of a seizure is the administration of chloroform by inhalation. Stephen (*loc cit*) states that ether is invaluable in checking an attack and may be followed by the administration of chloral. In the place of ether, morphine may be given by hypodermic injection.

Chloral in solution is recommended by Stephen, administered high in the bowel as a retention enema in 1 ounce (30 cc) of water or milk. The doses recommended are 4 grains (0.26 Gm) at 6 months; 6 grains (0.4 Gm) at 1

year, 8 grains (0.5 Gm) at 2 years. The effect is usually evident in 20 to 30 minutes. For convulsions that recur, luminal is deservedly popular.

Peterman states that the most logical treatment, which is equally as simple and effective as chloroform, but acts more slowly, is the administration of hypertonic solutions of magnesium sulphate (50 per cent), dextrose (from 25 to 50 per cent), or sodium chloride (from 5 to 10 per cent) by mouth or rectum in doses of from 2 to 8 ounces (60 to 240 cc). Sterile solution of magnesium sulphate (25 per cent) may be injected intramuscularly (from 5 to 10 cc— $1\frac{1}{4}$ to $2\frac{1}{2}$ drams) or intravenously (from 2 to 5 cc— $\frac{1}{2}$ to $1\frac{1}{4}$ drams—or from 10 to 20 per cent, slowing) for rapid effect.

The spinal fluid should be drained for examination and for relief of pressure, except in case of suspected tumor of the brain. In *intracranial hemorrhage* lumbar drainage removes the blood, irrigates the subarachnoid space and tends to prevent blood clots and the collection of fluid. However, it should be preceded by the intramuscular injection of blood. Spasmophilia or tetany may be treated immediately by the intravenous or intramuscular injection of calcium preparations (calcium gluconate) followed by viosterol in large doses.

D

DEAF-MUTISM.—G. E. Shambaugh (Arch Otolaryng 14:36 (July) 1931) presented interesting statistics on deaf-mutism and hearing impairment in children. There are approximately 45,000 mutes in the United States. This includes only those who acquired deafness before the age of 8. Approxi-

mately 10 per cent of the school children suffer from some defect in hearing. There are about 3,000,000 children in the United States with subnormal hearing, and over 10,000,000 with some defect in hearing. The important step in the prevention of congenital deafness is to discourage consanguinity, as well as

the bearing of children, by those with a family history of congenital deafness

He presents a survey from a previous report of the National Research Council in public institutions for the deaf that bears out his contention (*Ibid* 12 190 (Aug) 1930) Out of 5348 children examined, 3334 or three-fifths were congenitally deaf Heredity and consanguinity figured conspicuously in 1374 cases, where there were actually 232 instances of intermarriage, 112 being first cousins, 64 second cousins, and 36 third cousins, the rest being further removed There were 144 cases where the deafness of parents or relatives was present Interesting too was the fact that there were 484 instances of other children in the same family, from 1 to 5 as a matter of fact, including 17 pairs of twins, born deaf In 2069 of these 3334 cases, there were vestiges of hearing present, whereas 1261 had total deafness

The *etiology* of acquired deafness, according to Shambaugh, is mainly meningitis first, measles second, scarlet fever and influenza third Hereditary syphilis does not appear to be an important factor in the etiology of severe deafness in children From the study of acquired deafness, it was shown that little can be accomplished in the prevention of profound deafness from infectious diseases by more prompt or better care of the otitis media complicating these diseases The only hope lies in the prevention and the prompt cure of the disease itself

Periodic examination of the ears of school children is very important This may aid in preventing progressive deafness in adults by relieving and correcting tubal trouble in children The audiometer from the practical standpoint is not necessary It serves to divert the attention from the practical ob-

jectives in addition to being more or less troublesome The tangible objectives are most easily obtained by employing the simple voice tests

An excellent work on the *examination* of deaf-mutes was prepared by Heuning (Almquist and Wiksell, Upsala, 1928) This monograph on the subject of otologic examination of pupils in the deaf-mute institutes of Sweden served as a doctor's thesis There is an excellent chapter on the history of deaf-mutism, together with instruction of deaf-mutes The author states that one of the most important problems of deaf-mutism at present is to utilize the remnants of hearing if they are of sufficient degree that the individual may be trained by way of his own ears Attention is called to the fact that in ancient times a deaf-mute was neglected or even maltreated, as deaf-mutism was considered a mental disease

Exceptions to this rule were said to exist in ancient Persia and Egypt, where deaf-mutes were considered favorites of the gods and of heaven. Up to the middle ages, no progress was made until Cardanus, in 1560, called attention to the important fact that in deaf-mutism the deafness is primary, and that mutism is not due to any organic defect in the speech mechanism, but appears secondary to the deafness The subject of the *frequency* of deaf-mutism and the *method of examination* of the hearing is then outlined The author recites the actual investigation in the various districts of Sweden, the details of which are indicated in 27 tables

The general conclusions are that: (1) in all schools for deaf-mutes, systematic and regular examination should be carried out by otolaryngologists, who shall outline the exact treatment to be followed; (2) in districts in which there

are no otologists, arrangements should be made so that at least once a year otologists shall visit the schools to conduct the examination and direct the treatment, (3) it is desirable that all deaf-mute pupils should have their eyes examined carefully at least once a year. The latter examination is necessary because in most of these individuals it is necessary that lip reading be instituted, and, therefore, good eyesight is essential

There is a complete bibliography at the end of the monograph. Altogether, this is an interesting and valuable study in deaf-mutism from a practical standpoint and should prove of value especially to those who are engaged in teaching the deafened and hard of hearing.

TREATMENT—The problem of readjustment of the deafened person, whether he be child or adult, is a most important one, according to H. M. Hays (*Eye, Ear, Nose and Throat Monthly*, 465 (Dec.) 1931). This problem is being handled quite successfully by the various organizations which are associated with the American Federation of Organizations for the Hard of Hearing. The greatest boon, aside from whatever medical treatment can be given, is lip-reading and continual insistence that people who are deafened may be able to adjust their lives so that they become happy human beings. The schools throughout the country should have special classes for hard of hearing children. They should also have night classes in lip-reading for adults.

The problem is not a question of scientifically improving hearing so that the audiometer shows that the defect is 40 per cent instead of 60 per cent, but the adjustment of a person's life so that he may live more happily. Such a person can improve himself in his environ-

ment by taking up lip-reading, others will have to wear a hearing device. It is the duty of otologists to fit a person into a definite social and economic circle where he can be content. It often happens that such an individual is misplaced economically. He has the wrong job. It is, therefore, incumbent upon the physician to see that he gets the right job and that he forces himself to go about with hearing people, making light of his hearing as much as possible.

PROPHYLAXIS—In discussing the prevention of deafness, G. M. Coates (*Ann. Otol. Rhin. and Laryng.* 40: 651 (Sept.) 1931) states that the preventive measures fall roughly into 2 classes: measures directed toward eliminating the known underlying causes of deafness, and, on the other hand, diagnostic and therapeutic measures for detecting and curing the malady at a time when cure is still possible or for preventing its otherwise inevitable progression. Under the first head are included such underlying causes as syphilis, acute infectious diseases, hypertrophied and infected tonsils and adenoids, all infections of the upper respiratory passages, certain abnormalities of the nasal passages, the marriage of persons having a family history of deaf-mutism or otosclerosis, exposure to industrial and other noises, such as those caused by firearms or other high explosives, suppurations of the middle ear (which should be given proper surgical treatment), the use or administration of certain detrimental drugs, and the lack of proper care of the nose and ears during bathing and swimming.

The enlistment of various agencies to aid in eliminating the underlying causes of deafness is highly essential, as the problem is enormous and even partial solution will require long-con-

tinued efforts. These agencies include research, which must be heavily endowed, education, including that of the medical profession, public health authorities, the managers of certain industries that imperil the hearing of their workers, school authorities and the laity, propaganda to enforce this education, legislation to help secure the desired results, and means to impress on the minds of the people the great economic waste resulting from impaired hearing. The detection of incipient losses of hearing as early as possible is of the utmost importance. In order to accomplish this, a plea is made for the establishment of more clinics for the hard of hearing, where large numbers may be examined who could not or would not consult a private otologist. The checking of impaired hearing, when detected, depends on thorough study of the individual case, a careful history and the elimination of every possible causative factor.

DEAFNESS. — STATUS OF HEARING TESTS—D Macfarlan (Arch Otolaryng 13 47 (Jan) 1931) discusses the speech test, its shortcomings and the steps taken toward remedying them. The *phonograph speech test* with mechanical control of the intensity has been a great improvement. Attention, alertness, eagerness, memory, general intelligence, etc., play an important part in all tests of hearing, especially in the speech tests. However, little has been developed concerning these psychologic aspects of the tests of hearing which become evident when the deaf child is brought to the otologist for examination and diagnosis. These children usually have little or no speech. The questions that arise in these cases are: were they born deaf, is the hearing impairment partial or complete, is

the altered psychology due to the deafness or is it evidence of mental stigma? The question of the hearing may require several visits before the apprehension of the patient is overcome and his auditory attention and responses have been trained.

At times it is very difficult to differentiate between tactile and auditory response. This can be determined by placing the handle of a *sounding fork* on the mastoid, the patient moving his hand as long as he hears it. When the hand is stopped, the fork handle is inserted into the external auditory meatus, and if hearing is present, the patient will again raise his hand. It may be impossible at times to elicit response to tests for single tones until the familiarity and interest are developed in the patient, after which these tests may be used with favorable results. The use of the 4-A audiometer record of speech numbers in these cases is absurd, as these children have never used language. Their degree of loss of hearing can be roughly estimated if a record of simple rhythm is used, amplified through 2 tubes and controlled by an audibility meter which reads the loss of sensation units.

DECHOLIN-SODIUM (DEHYDROCHOLIC ACID PREPARATION).—According to I R Jankelson and W. S. Altman (New England J Med 206 796 (Apr 14) 1932), who report their results with the use of decholin sodium (dehydrocholic acid preparation) in *cholecystography*, this drug serves a two-fold purpose: (1) to accelerate the appearance of the gall-bladder shadow; (2) to increase the information obtainable from the routine examination by demonstrating the distensibility of the gall-bladder wall. The choleric action of decholin-sodium in-

creases the quality of bile excreted, although the concentration of the bile may be diminished. Its action, when introduced intravenously, is very prompt, lasting up to 90 minutes. In medicinal doses the drug is not toxic, causing no ill effects. These authors conclude that a satisfactory gall-bladder shadow may be obtained in 3 hours after intravenously administered tetraiodophenolphthalein with the aid of decholin-sodium.

The gall-bladder may be filled with tetraiodophenolphthalein by mouth within 5 hours with the aid of decholin-sodium. Decholin-sodium may be safely used in order to enlarge the gall-bladder shadow produced by tetraiodophenolphthalein. Failure to demonstrate increase in size of the gall-bladder outline within 15 to 45 minutes after administration of decholin-sodium is evidence, in the absence of serious liver pathology, that the gall-bladder has lost its normal capacity to enlarge with the ingress of bile.

The cholagogue effect of the intravenous injection of sodium dehydrocholate was investigated by R. F. Sterner, H. J. Bartle and B. B. Lyon (*Am J M Sc* 182: 822 (Dec) 1931), who studied the duodenobiliary secretion collected by means of the duodenal tube in a series of patients chosen at random from those undergoing treatment for various types and degrees of gastrointestinal disturbances. Realizing the difficulties and probable criticism of the duodenal collection of biliary secretion and its source of error, especially in quantitative volumetric determinations, the authors made observations of the physical characteristics and color changes in the bile which lead them to conclude that this error is reduced, if the observer is accustomed to watching

the ordinary return of bile obtained by duodenal tube biliary drainage. They conclude from the facts determined by the study that it is evident that sodium dehydrocholate in 2 Gm. (30 grains) doses intravenously increases the fluid return through the tube from the duodenum. They believe that this increase of flow is due to the extra amount of the liver bile, which seems to be excreted in response to the administration of this chemical substance. They inferred, however, that the sodium dehydrocholate seemed to inhibit the gall-bladder emptying function. No effort was made to determine the effect on cholesterol excretion from hepatic or duct epithelium.

DEFICIENCY DISEASES.—

The general interest which is now being displayed in nutritional problems and food deficiency disorders has resulted in the accumulation of considerable material which makes it clear that the resulting tissue changes are extremely variable and widespread, according to Chester S. Keefer (*New York State J Med* 32: 1405 (Dec 15) 1932). This condition naturally results in a wide variety of signs and symptoms.

It is quite clear that food deficiencies may arise, not only from inadequate diets, but also as a complication of processes which interfere with normal nutrition, such as a chronic diarrhea, or when added demands are made on the body as in pregnancy. The failure of the body to manufacture certain essential substances is well exemplified in pernicious anemia.

Two factors which must be borne in mind are the following: (1) dietary deficiencies in man are usually multiple and not single, and (2) the tissue changes, which occur as a result of deficiency, are so often the site of infec-

tion that the fundamental tissue changes due to the deficiencies themselves may be overlooked

The conditions in which the various deficiency disorders occur are summarized in Table I

TABLE I
CONDITIONS IN WHICH DEFICIENCY DISEASES DEVELOP

I Keratomalacia

- 1 Restricted diets
- 2 Chronic dysentery
- 3 Diabetes
- 4 Celiac disease
- 5 Tuberculosis of intestines
- 6 Ulcerative colitis

II Beriberi

- 1 Restricted diets
- 2 Chronic dysentery
- 3 Diabetes
- 4 Pregnancy
- 5 Hyperthyroidism
- 6 Celiac disease

III Scurvy

- 1 Restricted diets
- 2 Pernicious anemia
- 3 Chronic dysentery
- 4 Pernicious vomiting of pregnancy
- 5 Hyperthyroidism

IV Pellagra

- 1 Inadequate diet
- 2 Carcinoma of stomach
- 3 Carcinoma of ileum
- 4 Tuberculosis of intestine
- 5 Chronic dysentery
- 6 Stricture of rectum
- 7 Carcinoma of colon
- 8 Ulcerative colitis
- 9 Pernicious anemia
- 10 Chronic alcoholism
- 11 Stricture of esophagus
- 12 Pyloric obstruction
- 13 Gastroenterostomy

V Rickets

- 1 Inadequate diet
- 2 Celiac disease
- 3 Hypothyroidism

VI Tetany

- 1 Inadequate diet
- 2 Osteomalacia
- 3 Rickets
- 4 Sprue
- 5 Malabsorption of fat

- 6 Pregnancy
- 7 Lactation
- 8 Celiac disease

VII Osteoporosis

- 1 Celiac disease of adults
- 2 Sprue
- 3 Pernicious anemia
- 4 External biliary fistula

VIII Osteomalacia

- 1 Pregnancy
- 2 Inadequate diets
- 3 Hyperthyroidism

IX Edema Disease

- 1 Inadequate diet
- 2 Chronic dysentery
- 3 Tuberculosis of intestines
- 4 Pernicious anemia
- 5 Diabetes mellitus
- 6 Pregnancy
- 7 Lactation
- 8 Pellagra
- 9 Celiac disease
- 10 Chronic alcoholism
11. Cirrhosis of liver
- 12 Cardiac insufficiency

X Combined System Disease

- 1 Pernicious anemia
- 2 Gastric anacidity
- 3 Pellagra
- 4 Chronic dysentery
- 5 Cancer of stomach
- 6 Lathyrism
- 7 Gastrectomy
- 8 Ergotism
- 9 Sprue

VITAMINE A DEFICIENCY —

Xerophthalmia or *keratomalacia* has long been considered the result of this deficiency but it is now recognized that this may not occur until other manifestations of the deficiency have been present for a long time. Today it is known there is a widespread keratinization of the epithelium, especially of the respiratory and alimentary tracts, the eyes particularly, the paraocular and salivary glands and the genitourinary tract

In Table II the organs in which the changes occur, together with their clinical features, are summarized

TABLE II
VITAMINE A DEFICIENCY

<i>Pathologic Lesions</i>	<i>Clinical Features</i>
Keratinization of epithelium	Night blindness
Conjunctivæ	Xerosis conjunctivæ
Cornea	Xerosis corneæ
Lacrimal glands	Keratomalacia
	Diminution of tear secretion
Parotid glands	Xerostomia
Mouth	Leukoplakia
Trachea and bronchi	Bronchitis, tracheitis
	Bronchiectasis, pneumonia
Intestine	Ulcerative colitis
Genitourinary tract	Cystitis
	Urolithiasis
Skin	Hyperkeratosis follicularis

VITAMINE B DEFICIENCY.—

The various fractions of vitamine B have been divided into the antineuritic factor (B_1 or F), the pellagra preventive factor (B_2 or G), and several other fractions which are supposed to be necessary for weight maintenance and growth. The lack of this vitamine leads to changes in the central and peripheral nervous system, with resulting *retrobulbar neuritis*, *abducens*, *facial* and *vagal paralysis* and *peripheral neuritis*. Table III summarizes the pathological and clinical lesions attributed to vitamine B deficiency.

TABLE III

VITAMINE B DEFICIENCY

<i>Pathologic Lesions</i>	<i>Clinical Features</i>
Central nervous system lesions	Abducens palsy
	Facial palsy
	Recurrent laryngeal paralysis
	Retrobulbar neuritis
Peripheral nerves	Peripheral neuritis
Heart muscle lesions.	Cardiac insufficiency
	Pellagra (?).
	Acrodynia (?)
	Combined system disease

Peripheral neuritis of a vitamine deficiency origin is indistinguishable from

those of other origin. The association is drawn by the author of chronic alcoholism and diminished food intake with pellagra and vitamine B deficiency. Other clinical features of pellagra beside the skin manifestations include stomatitis, diarrhea, peripheral neuritis, combined system disease, psychoses, anemia and edema.

Acrodynia or *Swift's disease* is characterized by an erythema of the hands, face and feet, with desquamation of the palms and soles, excessive sweating, alopecia, insomnia, anorexia, and peripheral neuritis.

VITAMINE C DEFICIENCY.—

The adult or infantile type of *scurvy* is due to a deficiency of this vitamine. Increased capillary permeability occurs with hemorrhage, increased fragility of the bones and changes in the marrow, resulting in anemia. Hemorrhages resulting from traumatism show large ecchymoses, while those occurring spontaneously are seen at the base of the hair follicles and nowhere else. The blood platelets are normal, the clotting and bleeding times are normal, and the clot retracts.

TABLE IV

VITAMINE C DEFICIENCY

<i>Pathological Lesions</i>	<i>Clinical Features</i>
Increased capillary fragility	Hemorrhages into skin.
	Muscles
	Subperiosteum
Fragility of bones	Joints
	Gums, if traumatized
	Bone-marrow— <i>anemia</i>
	Internal organs—
	intestinal bleeding
	Hematuria.

RICKETS, OSTEOPOROSIS AND OSTEOMALACIA.—Lack of absorption of calcium and phosphorus occurs here. Marble and Bauer point out that some of the conditions are·

(1) dietary insufficiency of either calcium or phosphorus, (2) deficiency of vitamin D, (3) diets containing an excess of calcium over phosphorus or *vice versa*, (4) long-standing diarrhea; (5) any disease hindering absorption from the gastrointestinal tract; (6) long-standing biliary or intestinal fistulae, and (7) excessive secretion of fats

TETANY—The above statements regarding rickets, etc., may be made for tetany. It must be remembered that tetany may occur from parathyroid deficiency. Increased loss of calcium from the body, such as occurs in lactation and in pregnancy, may account for some cases of tetany.

TABLE V

VITAMINE D DEFICIENCY

<i>Pathologic Changes</i>	<i>Clinical Features</i>
Disturbed metabolism of Ca and P	Rickets Osteomalacia. Osteoporosis Tetany Dental caries

PROTEIN DEFICIENCY, EDEMA DISEASE, MALNUTRITION EDEMA.—When there is prolonged restriction of proteins from the diet, a lowering of the blood proteins takes place. This, in turn, results in the development of an edema.

TABLE VI

PROTEIN DEFICIENCY—NUTRITIONAL EDEMA

Decreased total serum proteins	Edema
Low basal metabolic rate	Bradycardia.
Decreased blood fibrinogen	Purpura.

This type of edema varies from the dependent form to that of a general anasarca. There is frequently a hyperkeratosis follicularis with hemorrhages into the skin and sclerae. The pulse is slow, the blood-pressure normal or low,

and there is no cardiac enlargement. Associated with the marked edema is a low basal metabolic rate. Weech and Ling found that when the serum-albumin was greater than 2.9 grams per 100 c c of blood edema was never observed and when the level fell below 2.5 grams per 100 c c edema was invariably present. They also found that the serum-globulin varied with the presence or absence of edema.

ANEMIA—For many years anemia has been considered to be due to malnutrition but only the highly important work of Whipple, Robschert-Robbins and their associates has brought about an appreciation of the value of the various food substances for the foundation of hemoglobin and red blood cell formation. The discovery of Minot and Murphy, showing the specific effect of liver and liver extract in pernicious anemia, has emphasized the importance of foodstuffs. Attention and credit should also be given to Castle, who showed that pernicious anemia may develop as a result of a disorder of the stomach which prevents the manufacture of sufficient amounts of essential substances from certain food products.

TABLE VII

CONDITIONS IN WHICH MALNUTRITION IS A FACTOR IN THE PRODUCTION OF ANEMIA

- 1 Inadequate diets including avitaminosis
- 2 Chronic dysentery
- 3 Hookworm infestation
- 4 Pregnancy
- 5 Tuberculosis of intestine
- 6 Sprue
- 7 Celiac disease
- 8 Malabsorption of fat
- 9 Partial and complete gastrectomy
- 10 Multiple intestinal strictures
- 11 Chronic alcoholism.
- 12 Chronic hypochromic anemia (achlorhydric anemia)
- 13 Some cases of cancer of stomach and intestine
- 14 Biliary fistula (external)

TABLE VIII
CASES OF MULTIPLE DISORDERS IN
ADULTS

- 1 Keratomalacia and beriberi
- 2 Keratomalacia and rickets
- 3 Keratomalacia, rickets, and beriberi
- 4 Keratomalacia and edema disease
- 5 Keratomalacia and hyperkeratosis follicularis
- 6 Hyperkeratosis follicularis and edema disease
- 7 Hyperkeratosis follicularis and scurvy
- 8 Beriberi and pellagra
- 9 Beriberi and scurvy
- 10 Beriberi and rickets
- 11 Beriberi and edema disease.
- 12 Hemeralopia and keratomalacia
- 13 Hemeralopia and beriberi
- 14 Hemeralopia and scurvy
- 15 Hemeralopia and edema disease
- 16 Scurvy and edema disease
- 17 Rickets and tetany
- 18 Rickets and edema disease.
- 19 Osteomalacia and tetany
- 20 Tetany and edema disease
- 21 Pernicious anemia and scurvy
- 22 Pernicious anemia and pellagra.
- 23 Pernicious anemia and edema disease and osteoporosis
- 24 Pellagra and subacute combined disease
- 25 Pellagra, osteomalacia, and tetany

DELINQUENCY (JUVENILE).

—Many factors have been considered in the search for causes of juvenile delinquency. Physical defects have never been found to have an important influence, but retarded mentality and social maladjustment have seemed to be the basis of many juvenile crimes. In a study of 41 boys who had some behavior difficulties or had committed some minor offense, E. L. Richards (*J. Pediat.* 1: 558 (Nov.) 1932) found only 10 instances of demonstrable physical defect which might account for the behavior. However, all but 4 boys of the group had intelligence quotients below the average and in a group of 38 delinquent girls, only 6 were found to have normal intelligence. The strain of the

DELINQUENCY (JUVENILE)

higher grades of school for the retarded children of this group who could not maintain the pace was thought to be a contributing cause of the abnormal behavior, and this may apply to a large number of other individuals. About 25 per cent of the total number of school-age children have been found to be incapable of doing the work of grades higher than the fourth or fifth, while others seem to do normal intellectual work up to the age of 12 or 14 years and then begin to lag behind. Special training classes were suggested as the proper means to satisfy the retarded child's desire for activity and achievement.

A somewhat similar conclusion was reached by E. W. McElwee (*J. Juvenile Research* 15: 208 (July) 1931) from the study of 110 children, 7 to 13 years of age, who were frequently truant from school. About half of this number of children were on or below the lower border line of normal intelligence and were generally 1 or 2 terms of school behind the average child in regard to their ability to do the class work. Yet many of these retarded children had been advanced from grade to grade until the work expected of them was considerably beyond their capacities.

The relationship between juvenile delinquency and *feeble-mindedness* has been the subject of numerous reports during the last few years. Statistics of this nature must be very large to be conclusive and the series studied must be compared with control groups before any general deductions can be drawn. The accumulation of data suggests, however, that feeble-mindedness occurs with greater frequency in delinquent than in normal children, but this fact alone is insufficient to explain the majority of juvenile crimes.

In a report of 401 delinquents, F Frank (J Juvenile Research 15 192 (July) 1932) found only 6 per cent of the group to be definitely *feebleminded*, and an additional 10 per cent were on the borderline of normal mental capacity. Forgery and embezzlement were committed by adolescents of higher intelligence, while sex crimes were predominant among the mentally deficient. It was noted that the feebleminded had records of repeated arrests much more frequently than those of the higher mental levels. In this investigation, broken home relationships seemed to play an important rôle in leading to delinquency. On the other hand, an investigation by E W Ruggles (J Juvenile Research 16 125 (Apr) 1932) of 103 boys, 16 to 22 years of age, who had been guilty of crime, revealed a low average of intelligence (I Q 73). In mechanical ability also the delinquents were less adept than the normal boys. Crimes requiring higher degree of skill had been committed by the boys of this group who possessed the greater mechanical ability and sex crimes had been more frequent among boys of lower intelligence. It was thought that broken and unhappy homes contributed considerably to the delinquency of these adolescents.

In the opinion of F C Richmond (J Am Inst Crim Law and Criminol 21 537 (Feb) 1931, Am J Dis Child 43 243 (Jan) 1932), all juvenile delinquents should be given mental tests, and those who have intelligence quotients of less than 75 should be included in the group of *feebleminded*. Next to the factor of disturbed home relationships, the author believed that feeblemindedness was the most important cause of delinquency. He quoted statistics gathered in the army to the effect

that 42.3 per cent of the persons requiring disciplinary measures were feebleminded. It was thought that the feebleminded children might be divided into 2 classes, the first including the potential delinquent who should be given special training, supervision and protection, the other class being made up of the confirmed delinquents who must be segregated from society. With the help of a certain amount of training, it might be expected that a few of this latter class could return to society later and live normal lives.

A large number of persons interested in delinquency believe that broken home relationships and disturbances in adjustment to environment lead to a large majority of the criminal acts of children. This was the conclusion reached by J C Beane (J Juvenile Research 15 198 (July) 1931) from the results of a study of 300 girls, most of them over 12 years of age, who had been institutionalized for some sort of sex delinquency. About 46 per cent of this group had intelligence quotients of less than 80. In 93 per cent of instances, however, the homes were found to be insufficiently supplied with the necessities of life, and about 73 per cent of the homes were broken by divorce, death of one or both of the parents, or for some other reason. The author thought that institutional care and training had been a great help to these girls, since 50 per cent of the number who had been paroled were found to be living normal, well-adjusted lives in their communities.

Among the recent investigations which show less indication of a close relationship between home conditions and delinquency of the children are those of R White and N. Fentor (J. Juvenile Research 15 101 (Apr) 1931). They

compared the social background of 2 groups of delinquents of varying mentality. Among a group of 277 delinquent boys, 160 had intelligence quotients of less than 95 and 117 had intelligence quotients of more than 95. Although these 2 series of patients were not considered large enough to allow conclusions to be drawn, it seemed that the home conditions of the brighter boys were just as unfavorable as those of the duller group. The type of crime committed did not vary much among the boys with the different mentalities except in the case of forgery, which was more frequently committed by members of the more intelligent group. In regarding all types of sex offenses, these investigators found the frequency about equally common in both groups. There did not seem to be any tendency for the brighter boys to be more solitary or introverted than the duller ones, and association with companions or gangs had been about equally common in both groups.

The general changes in population, ideals and customs and their relationship to behavior of children and juvenile delinquency, especially in the negro race, has been reviewed by I S Wile (*Arch Pediat* 49 494 (Aug) 1932). In the first place, the declining birth rates in the United States have tended to make the proportion of adult population much larger in comparison with the number of children. On the other hand, in the negro race, illegitimate births and the higher death rate of negro adults has an influence upon breaking up of home life and reducing parental guidance much more than in the white race. The migration of the negro to the cities has increased in recent years and this adjustment to different surroundings and modes of life has been more disturbing

to homes and family life. A large number of children are receiving a more intensive education and their increased diversity of interests, such as the movies and periodicals, and the general tendency of society toward freedom of action and speech, has created an independence of authority which has been reflected in the behavior of children and has decreased parental restraint. The community and state have assumed many responsibilities of the home. The writer concluded that it would be necessary for the adult population to re-investigate its own ideals of conduct in order to create new definitions of behavior difficulties and delinquency in children.

TREATMENT.—In the treatment of the delinquent juvenile, it would seem that a thorough investigation of his environment, especially the home conditions, should be made, if it is true that the absence of one or both parents and faulty social adjustment are outstanding etiologic factors of abnormal conduct. The minor behavior problems of the child early in life are not far separated from the delinquency of later years. As a means of approach to this problem, the child guidance clinic has been successful in many localities. The activities of such a clinic in New Orleans has been reported by C S Holbrook (*South M J* 25 50 (Jan) 1932). During the preceding year the 489 patients who had attended the clinic had been referred there by parents, social agencies, schools and the Juvenile Court. When it was necessary, the child was examined by the social investigator, the pediatrician, the psychologist and the psychiatrist, and from the results of the combined efforts, treatment was advised. The average time spent on each individual case was 64 hours. The principal aims of the clinic

were to raise the standards of the work with children with the hope of preventing the maladjustments which might lead to crime

DENTAL CARIES.—The medical profession has been rather slow to recognize the importance of the condition of the teeth and mouth in relation to local and systemic diseases, according to J Leon Williams (*Dental Cosmos* 74 229 (Mar) 1932) There is no exaggeration in the statement made by W D Tracy, that if physicians and dentists could unite in finding a way to prevent dental decay, "it would be one of the greatest benefactions that could come to the human race" While many of the keenest minds in dentistry have been devoted to a study of the causes and prevention of caries for a great many years, it is still, in the last analysis, an enigma

The theories concerning the etiology of dental caries that have been offered for consideration by investigators in this field can be divided into 2 groups, *ie*, (1) those who believe that dental caries is due to the external environment of the tooth, and (2) those who believe that it is related to the internal environment of the tooth

J Leon Williams, a member of the extrinsic group, is of the opinion that, "a clean tooth will not decay" because it cannot decay if kept free from acid-forming bacteria which are the immediate, inciting cause of decay Acid-forming bacteria become attached to such places on the enamel as cannot be easily reached by the tooth brush or coarse food in the act of mastication These bacteria convert starch and sugar into lactic acid and this acid dissolves the enamel, thus forming a pit or cavity which eventually penetrates

the enamel and reaches the dentine Williams contends that there is no enamel that is not dissolved by the action of lactic acid

A change in food habits may so change the character of the fluids of the mouth as to inhibit the growth and action of acid-forming bacteria, which are the immediate cause of decay, and so arrest the disease

More attention is being focused on dental caries as a disease resulting from metabolic rather than purely local disturbances This second group including Percy Howe, John Marshall, E V McCollum, Henry Klein, May Mellanby, Theodor Rosebury, Maxwell Karshaw, and others, have reported dental caries in experimental animals as a result of unbalanced diets

TREATMENT.—McCollum and Klein have emphasized the importance of an adequate mineral ratio and content of calcium and phosphorus. Evidence has been presented indicating the importance of **vitamine C** in the formative processes of hard tissues, especially the teeth The use of **vitamine D** has been recommended, and data has been presented to support this view by May Mellanby (*British M J* 2 749 (Oct 22) 1932) who has devoted many years to physiological and biochemical researches chiefly in relation to teeth and their associated tissues She has shown that

- 1 For the production of well-formed teeth an adequate supply of fat-soluble **vitamines**, especially **vitamine D**, is essential

- 2 Cereals antagonize the action of **vitamine D** and tend to produce badly formed teeth when this **vitamine** is deficient.

- 3 The diet must contain some calcium and phosphorus, the chief components of

teeth and bones, but the amount necessary depends largely on the vitamine available

4 If a mother is fed during pregnancy and lactation on a diet deficient in vitamine D, the offspring shows defective calcification of the deciduous teeth.

DERMATITIS.—ETIOLOGY.

—Jui Wu Mu (Chinese M J 46 449 (May) 1932) listed the sugar tolerance in 9 cases of *arsphenamine dermatitis*. The dermatitis consisted of erythrodermia, papular and purpuric eruptions. The duration of the dermatitis varied from 2 to 14 days. Eight patients showed delayed blood sugar curves and, in addition, 4 revealed a high fasting blood sugar content. One patient had diabetes. The blood sugar changes could be related to the extent and degree of the dermatitis but not to the type and duration of the eruption. The author suggests that the cause of the blood sugar changes is primarily associated with impairment of the glycogen metabolism of the liver brought about by a deleterious effect of arsphenamine on this organ.

It is suggested by G. Gordon Campbell (Brit J Dermat 43 297 (June) 1931) that intolerance to sugar might have a wider application to the etiology of skin diseases than appears offhand, and he presents an analysis of 132 cases of skin diseases in which the sugar tolerance was determined, 77 per cent. positive results being obtained.

Dermatitis which develops for the first time at middle life or after is very likely to be associated with sugar intolerance, also, cases which give a history of recurrent attacks, especially during cold weather and from no apparent cause.

Many cases are resistant to all forms of treatment. Dermatitis accounts for over 50 per cent of cases showing intolerance of sugar. Dieting proved an important help in their cure. *Dermatitis seborrheicum* and the acne of adolescence furnished a number of cases. Many of the skin lesions occasionally associated with diabetes, such as paronychia, sycosis, and furunculosis, as well as dermatitis, were found in cases of low average intolerance. The average age was 48 years. Sixteen cases were definitely cured, 1 relapsed and 14 showed marked improvement. The tendency to so-called "chapping" of the hands in cold weather, combined with induration of the skin of the tips of the fingers, causing desquamation of the skin and troublesome fissures, is suggestive.

Eleven out of 15 cases of *dermatitis seborrheicum* were positive. The average age of the patients was 24, 3 were definitely cured and 4 much improved by dieting.

Nine out of 12 cases of *acne vulgaris* showed sugar intolerance. The average age was 20 years, and in every case rapid improvement followed an appropriate diet. Of 7 cases of *lichenification*, 6 showed intolerance to sugar, 4 being greatly improved and 2 entirely cured. *Pruritus*, without any visible lesion of the skin, gave positive results in 5 out of 8 cases, and in 2 others a dermatitis due to the epidermophyton fungus was associated with intolerance. An abnormally high blood sugar finding should be regarded as only contributory, possibly by lowering the resistance of the skin to irritants.

John T. Ingram (*Ibid* 44 422 (Aug-Sept) 1932) in dye dermatitis in relation to idiosyncrasy concludes that approximately 4 per cent of normal in-

dividuals show an idiosyncrasy towards the phenylenediamines. In these subjects contact with the chemicals provokes dermatitis. The resulting dermatitis may not appear for a period varying from 24 hours to 24 days after contact. It is evident from this work that "patch test" investigations need to be kept under close observation for a period of not less than 1 month to secure accurate results.

DERMATOSES, INDUSTRIAL. — ETIOLOGY. — During the past few years, research work and clinical investigation have entirely changed certain aspects of industrial dermatoses. The demonstration of the fundamental importance of *allergy* in the production of dermatitis or eczema, especially using the patch test, and also the passive transfer method of Prausnitz and Kustner, has been shown by the work of Jadassohn, Bloch, Sulzberger, Wise and others. E. D. Osborne and E. D. Putnam (J. A. M. A. 99:972 (Sept. 17) 1932) go into the details of present knowledge on the subject. Allergy as related to industrial dermatitis is one of the main topics discussed. They cite the definition of Bloch for allergy as being the most satisfactory at the present time, and therefore, it is quoted in full here:

Allergy is that state which has as its basis the property of certain groups of cells (organs) of the living organism to react in a specific manner when brought in contact with a substance, which is, as far as is known, foreign to the organ or cells, the characteristic of this specific pathologic process lies in the fact that it is caused by the reaction of this exogenous substance with its specific cellular fixed antibody. The basis and the essence of allergy is the ability of the living cell to react with the production of specific antibodies to the stimulus of foreign substances which are therefore called antigens.

The term *idiosyncrasy* in the light of recent experimental work loses much of its former meaning. Idiosyncrasy, as a medical term, refers to a peculiarity of constitution, and a person is said to be idiosyncratic who exhibits allergic manifestations following exposure to poison ivy. However, since experimentally it has been pointed out that 80 per cent of all persons are allergic to *Ascaris*, 60 per cent to poison ivy, and 45 per cent to orthoform, and that by using the concentrated extract of primula Bloch showed an allergic state in the skin of 100 per cent of persons, the question comes up, where does idiosyncrasy end? If 60 per cent of individuals are positive to poison ivy, certainly it is impossible to state that they show a peculiarity of constitution and that the 40 per cent of persons are normal. The term idiosyncrasy, therefore, means little and leads to confusion, so that it should be ruled out. These authors also agree with Highman, who shows that the term allergic dermatitis should not be used, since it is the person and not the dermatitis that is allergic.

For brevity, the authors list the following information shown experimentally and clinically to be of value in studying industrial dermatitis due to allergy:

- 1 Allergy can be produced by substances of a nonprotein as well as of a protein nature.

- 2 The location of the allergy may be in a circumscribed area of the skin, such as the dorsa of the hands or forearms, or it may be present in the entire cutaneous surface or in all the organs and tissues in the body. In industrial cases, it must be kept in mind that the allergic area may be localized to certain parts, particularly the hands and forearms.

3 The eczema tests of Jadassohn and Bloch or, more popularly, the patch tests, are superior to all others in showing a cutaneous allergy

4 Stauffer has indicated that substances with a high hydrogen ion concentration produced a greater reaction than those with a neutral reaction This may be of great importance

5 Bloch and Steiner-Wourlisch demonstrated experimentally, causing sensitization to primrose extract in guinea-pigs, that a so-called incubation period of from 7 to 10 days existed between the first application and the appearance of an allergic reaction

6 Bloch and also Stauffer were unable to demonstrate antibodies in the blood serum of patients with eczematous eruptions due to allergy by the method of Prausnitz and Kustner Bloch states that it is possible that the antibodies are fixed in the cutaneous cells and do not become free in the blood stream This is of great importance in the consideration of therapy and may explain the refractoriness to desensitization of dermatitis due to allergy

7. While specific antibodies have not been demonstrated in the serum of a patient suffering from a dermatitis due to allergy, it has been shown frequently that this allergy is specific for the particular substances or chemicals, and that other substances or chemicals unrelated to the particular one causing the dermatitis will not produce a like reaction unless the individual is also specifically allergic to them This point is of great value in industrial dermatoses

During the past 5 years, 216 cases of industrial dermatoses due to allergy have been studied by Osborne and Putnam For purposes of discussion the cases were arranged in particular groups

GROUP I (104 Cases) —In a large rayon plant, a change was made from a nonsulphonated oil to a new *sulphonated oil* in manufacture About 200 workers were exposed and their hands were constantly bathed in the oil For 3 days after the change nothing happened, when a young woman reported with a mild dermatitis of the face, neck, hands, and arms During the next 10 days, numerous cases were found, and at the end of 2 weeks the dermatitis developed in 104 workers The following facts were brought out from the investigation (1) All workers were exposed simultaneously (2) The latent period was from 3 to 14 days (3) As new cases were appearing daily, it was probable that a much larger number of workers would become sensitized to the oil (4) Patch tests were definitely positive in all persons showing the dermatitis (5) Two workers with normal skins were tested daily up to the time the dermatitis developed The patch test became positive simultaneously with the appearance of the dermatitis on the exposed parts (6) Three of the workers tested with ultraviolet light showed a marked increased sensitivity (7) Since the company resumed the use of the oil formerly used, no further cases developed

GROUP II (15 Cases) —One summer during a period of 4 weeks, 15 linemen working on high tension wires developed dermatitis of the hands and wrists, varying from a mild erythema to severe bullous dermatitis extending to the face and neck The cause was found to be a new brand of rubber gloves worn by the linemen while working on high voltage lines Investigation showed the following (1) The dermatitis did not develop until after the new gloves had been worn for several days (2) Patch tests, with both old and new gloves, on linemen in whom dermatitis had not developed were negative Patch tests with rubber removed from new rubber gloves were uniformly positive in all 5 patients with the dermatitis (3) The sensitivity was proven due to *tetramethyl-thiuram-disulphide* (4) By changing the brand of gloves, only 1 lineman continued to have trouble He evidently had become so sensitized that he reacted to the smaller quantity of the sulphur compound present in the gloves formerly used with immunity

GROUP III (11 Cases) —These cases were florists, 10 of whom were found to be sensi-

tive to *chrysanthemums* or *pompoms*, and the other was due to sensitivity to *tulips*.

GROUP IV (26 Cases) —One hundred and ten pipefitters were rushed to repair a building in which an explosion occurred during the production of substances such as nitrosophenol. Four days after beginning work, 1 pipefitter, then another, developed a severe dermatitis of the face, neck, hands, and arms, which was proven to be due to contact with a *chemical dust* that had collected for years on the many pipes in the building.

GROUP V (8 Cases) —These patients were workers in a chrome-plating establishment, and when a change in the apparatus used was made the men were exposed to *cyanide fumes*. Three days later, 5 men showed a mild dermatitis on the face, neck, hands, and arms.

GROUP VI (Miscellaneous Group) —This is a miscellaneous group of 39 individuals from many different industrial plants in and around Buffalo, N. Y. In 4 patients, a positive patch test to paranitrosodimethylaniline, a chemical used as an accelerator in the curing of rubber, was found, 2 patients from a rubber company gave positive patch tests for sulphur powder, 4 from a chemical plant gave positive reactions to nitrosophenol, and 3 others from the same plant showed positive tests for dinitroschlorbenzol. Numerous other chemical irritants such as varnoline, mineral spirits, xylene, acetone, crude coal tar, potassium cyanide, formaldehyde, soap, podophyllin, flour dust, duco, and procaine hydrochloride were noted as underlying causes of sensitivity in patients.

Osborne and Putnam conclude that the era of immediate or snapshot diagnosis in any case of industrial dermatitis is passed. It requires a great deal of time, patience and energy to find the underlying irritant. Large sums of money could be saved if a prompt diagnosis were made, and the proper preventive measures instituted. If a change in occupation is necessary, the sooner it is accomplished, the better it will be for all concerned.

DIABETES MELLITUS. — INCIDENCE.—The growing importance of diabetes as a health problem is being

recognized by progressive physicians and Boards of Health. A very timely and constructive contribution in this field is made by C. Bolduan (*New England J. Med.* 207:49 (July 14) 1932). In a careful survey of the statistics of the Department of Health of New York City for the last 50 years, the author notes a decrease in the general death rate from 29 to 11 per 1000, but a marked increase in the number of deaths from diabetes which, in 1931, totalled 2000 in a total number of deaths of 78,000 which was nearly twice as many as occurred from acute communicable diseases. He emphasizes the close relationship between the national death rate from diabetes and the national *sugar consumption*. This shows a parallelism which is striking. It is still an open question whether this is a direct relationship.

Many investigators feel that this increase of sugar is a part of a common tendency toward overeating and thus, continued without sufficient exercise, results in obesity which has been proven statistically to be a frequent forerunner of diabetes. From these tables Bolduan shows that the greatest number of deaths occur over age 45; that the rate among females is twice that among males, but that this only is true of married and widowed females. He states:

"In view of what clinical experience has shown as to the effectiveness of modern treatment of diabetes, it seems to me that this analysis points to an increasing prevalence of diabetes, and that this is sufficiently great to overbalance the benefit which has resulted from improved treatment."

Unfortunately, no means of determining the prevalence of diabetes are available. Mortality figures may be obtained, but none relating to morbidity.

This is a serious defect, not merely because of the statistical basis thus lacking, but especially because of the value such morbidity reports would have in any organized efforts to control diabetes.

Some time ago, the Massachusetts State Department of Health made an investigation of the prevalence of various chronic diseases, including diabetes. House to house visits were made and a considerable proportion of the population of the State was thus "sampled." On the basis of this investigation it was concluded that there were now some 14,000 diabetics in that State. On the basis of the Massachusetts rate, and bearing in mind the large Jewish population in New York City, it may be estimated that there are about 25,000 diabetics in New York City at the present time. However, this is only a very crude estimate; no trustworthy figures are available.

Diabetes is comparable to tuberculosis in frequency, but in tuberculosis there is a well organized health campaign, while in diabetes nothing has been done. The field holds a definite promise of yielding valuable results. The author feels that such control should start through the education of the general practitioner and that the result which may be expected will be better than those obtained in communicable disease.

The importance of considering the relationship of national consumption of *carbohydrates* and incidence of *diabetes* is also stressed by J. H. P. Paton (Edinburgh M. J. 39 556 (Sept) 1932). He shows graphically the rapid increase in the last 100 years in the amount of sugar consumed in the British Isles and emphasizes the point that sugar is an unnatural foodstuff and that it was not known or used in Europe until 1563. He feels that quite

aside from its possible effect in the development of diabetes and of, at times, hyperinsulinism, it contributes to the frequent development of catarrhal infections, particularly in children. If this observation is true, it would seem then that excessive sugar consumption might be playing a very definite rôle in the production of diabetes in one of three ways: (1) by contributing to the production of obesity, which is very definitely an etiologic factor in diabetes, (2) by its possible overstimulation of the insulogenic system, and (3) by favoring the development of upper respiratory infection.

The possible relationship of increased sugar consumption and the increasing number of cases of diabetes has been rather minimized in this country, but certainly the statistics presented in the 2 papers mentioned above would make it seem more than a coincidental development.

PATHOGENESIS—The question of whether all cases of diabetes are of insular causation or due to some deficient central stimulation of the insulogenic mechanism is still a moot point. There are many advocates of both schools of thought and most frequently it will be found that the foreign investigators are prone to support the latter thought. In discussing this point, L. Pollak (Wien klin. Wchnschr 45.257 (Feb) 1932) calls attention to certain contradiction in galactase dextrose accumulation which he terms the "galactase paradox of diabetes," and describes the tests that he made to determine the mechanism of certain processes in sugar metabolism. He sums up the last group of his experiments as follows: a galactase tolerance test produces in diabetes a considerable increase in the blood dextrose. Thus, he feels, indicates the

elimination of large quantities of sugar by the liver

Ergotamine tests revealed that in diabetic patients, just as in persons without diabetes, the glycoscretory impulse comes from 2 distinct endocrine glands. Both types of impulses are found in entirely different forms of diabetes. If these conditions are to be traced to a common cause, the author considers only one explanation possible, *viz.*, that the glycoscretory impulses are the same in diabetic and nondiabetic individuals and that in diabetics, therefore, there is a greater increase in the blood dextrose because there is no checking influence of insulin which reduces the stimulation susceptibility of the liver.

J J R Macleod, in the Linacre Lecture (Lancet 1 1079 (May 21) 1932), discusses at length the control of *carbohydrate metabolism*. He discusses the piqure experiment of Claude Bernard and the results of many of his own experiments. He seeks to develop the exact location of the region in the hypothalamus which is thought to be a sugar controlling center. This was done by severing the brain stem of rabbits at varying levels. From these experiments, which were performed on many animals, he concludes that the center is situated in the tegmentum of the pons. His experiments do not bear out the view that the motor nucleus of the tenth nerve may be the sugar center as has been indicated by other investigators.

He feels that the hyperglycemic effect of this transection is due to a mechanical stimulation rather than the actual destruction of some center in the pons which is responsible for the diabetogenic effect. He states that his observations do not bear out the supposition that the effects of decerebration are due to the

increased production of sugar from the glycogen of the liver, but that the explanation of it is due to one of two possibilities: (1) that the liver produces sugar from sources other than its glycogen, or (2) that the use of sugar by the muscles and other tissues becomes suppressed.

In determining the part played by the second of these suppositions, he estimates that the sugar must pass from the blood plasma into the tissues and shortly after entering the tissues disappears as such, being converted into glycogen and ultimately into lactic acid, and comes to the conclusion that the change in the blood sugar is possibly due to a slowing up in the rate at which the muscles form glycogen from the blood sugar. He then discusses the relationship between nervous control and the hormones and hyperglycemia and feels that the balance between insulin and adrenalin is controlled by a nervous mechanism which keeps these 2 hormones in varying strengths as the individual organism may require.

He states that the nervous system might bring about a rise in the blood sugar in one of three ways: (1) stimulation through the hepatic nerves of the glycogen already present in the liver or in the process of glucogenesis; (2) by the stimulation of the internal secretion of adrenalin, and (3) inhibition of the internal secretion of insulin.

He attempted to prove this by sectioning the vagus nerve in the neck of fasting rabbits and found that in these cases decerebration did not cause the usual degree of hyperglycemia unless the liver contained rather large amounts of glycogen, which he felt might be explained by the fact that there are 2 kinds of glycogen in the liver, *viz.*, one associated with the process of gluconeogenesis

which is under the parasympathetic nerve control, and the other, merely a storage form for glucose into which it may be converted by other influences and that the latter is the type of glycogen which is liberated even with an interruption of central nerve stimulation

He reported his tests with atropine and amytal and found that these two acted comparatively to section of the vagus nerve, and that it is justifiable at the present time to postulate that when the requirements are more or less steady, the rate of sugar production is regulated by alteration in the ratio between insulin and adrenalin in the blood, but that when there is sudden call for sugar to meet the demand by greater muscular activity, direct nervous stimulation of glycogen secretion by the liver is set up and that these hormones are subject to nervous control through the pons

The clinical observation that the diabetic state is aggravated by *infection* is borne out by some recent work that carbohydrate metabolism in the normal animal might be impaired by the same cause. This fact has been variously ascribed to a suppression of the insulin secretion and overstimulation of the adrenalin or thyroid, or even to a destruction of the circulating insulin by the toxic agent. The only factor, however, in carbohydrate regulating mechanism that has been investigated is the blood sugar

B. Corkill (J Physiol 75:381 (Aug) 1932) feels that the disturbance is more deep-seated than this and has attacked it from the viewpoint of the *storage of liver glycogen*. Previous work has shown that in normal young rabbits small doses of insulin markedly increased the deposition of glycogen in the liver and this has been thought to be a "locking" action of insulin, i.e., pre-

venting the conversion of glycogen into glucose, although Corkill's work has suggested that this may be due to the action of the adrenalin secreted owing to the insulin hypoglycemia

He studied the glycogen deposit of young rabbits that were rendered toxic by the injection of diphtheria toxin, which is known to produce definite damage to the adrenalin bodies, and he found that the normal effects of insulin and adrenalin alone in causing accumulation of liver glycogen are suppressed, that when the 2 hormones are given together in preparations which cause glycogen deposit in the liver of normal animals, the effect is again suppressed in the toxic condition. Blood sugar determinations showed that these patients are usually resistant to insulin and that the recovery from hypoinsulinism was abnormally rapid, which the author attributes to an excess of the normal effect of adrenalin. This supposition is supported by the fact that ergotoxine delayed the abnormally early recovery, but it is significant that ergotoxine did not facilitate the deposition of glycogen in the liver

The question of *cholesterol metabolism* in diabetes is a very interesting one and a phase of diabetic management which is becoming of increasing importance. Many men working in this field do not feel that their cases are satisfactorily standardized until the blood cholesterol, as well as the rest of the blood chemistry, is within normal limits. Blood cholesterol is, of course, an indication of the lipides of the blood and is thought by many to play a very large part in the development of arteriosclerosis

H. O. Mosenthal (Arch Int Med 50:684 (Nov) 1932), in a comprehensive article concerning the *relationship*

of sugar to the cholesterol in the blood, reviews the work of many investigators in this field. He points out that there are several complicating factors which may arise in the course of diabetes mellitus that may raise either the blood sugar, plasma cholesterol or both. Severe acidosis, coma, malnutrition, overnutrition and a long-continued high fat intake are some of these conditions. The blood sugar may be elevated in many of these, while in others, there is no change from normal. He undertook to investigate the point as to whether or not the change of the blood sugar level itself had any bearing on the concentration of the plasma cholesterol, as he felt that such a determination had a distinct bearing on the clinical interpretation of cholesterol value. His study represents the analysis of the concomitant fluctuations in blood sugar and plasma cholesterol in 95 individuals who were normal or who gave evidence of either mild diabetes or renal glycosuria. After a 14-hour fast, the patients were given 100 Gm ($3\frac{1}{8}$ ounces) of dextrose by mouth. Synchronous determinations of the sugar and cholesterol were made before the investigation of the dextrose and subsequently at intervals of 20, 40, 60 and 120 minutes. He took as a normal variation in the blood cholesterol the figures of Bruger and Somach, who found that a normal variation of 7.8 per cent might be expected. He considered as a normal sugar tolerance curve one in which the blood had returned to a level of 140 mg after 2 hours or to 120 mg after 3 hours, 58 per cent of the cases were below this, while 37 per cent were above it. His résumé of his work shows that the rise in blood sugar may be accompanied either by a constant increase or decrease in the cholesterol

values and he feels that the factors bringing about these changes are probably in part compensatory osmotic phenomena and he states that the speed and efficiency of the oxidation of the dextrose and storage of it as glycogen may be other factors that influence the level of the plasma cholesterol, but that there is a very definite relationship between the level of the blood sugar and that of the cholesterol, although such a relationship cannot be anticipated in all of the cases.

PATHOLOGY.—Circulatory Phases.—Anyone who follows the literature on diabetes has been impressed with the increasing evidences of coronary symptoms and acute coronary deaths in diabetics. A very timely article on this subject is that by M. H. Nathanson (Am J M Sc 183:495 (Apr) 1932) in which he reports his detailed studies on 100 autopsied diabetics. He found that 41 per cent of these showed evidence of severe *coronary disease* and that above the age of 50 the evidence was 52.7 per cent as compared with 9 per cent in an even larger series of nondiabetics of the same age. The occurrence was almost as high in the female as in the male. Aside from the coronary disease, there was very little other cardiac change observed in these cases. Three showed the *hypertrophy* characteristic of a hypertensive heart disease and these 3 died of congestive failure. There was 1 case of *luetic aortitis* and 1 of *chronic mitral valve defect*. The author notes, as have other men investigating this same field, the comparative infrequency of rheumatic heart disease. In the diabetic in cases dying in coma or acidosis, there was a rather characteristic pale, swollen and cloudy heart muscle, typical of a toxic myocardium.

He also noted that in those with diabetic gangrene the incidence of coronary disease was greater and that many of these died cardiac deaths. He feels that the essential lesion of diabetes is *coronary sclerosis*. [This has great clinical value when it is realized that a heart with narrowed and sclerosed vessels requires an adequate amount of carbohydrate to carry on its function. This is true of the nondiabetic as well as the diabetic and it should cause hesitation about reducing the blood sugar of these patients too low, for there are many evidences that hypoglycemia may be followed by coronary thrombosis. It has been found a safe rule to consider as a top normal blood sugar value in elderly diabetics a figure equal to their age plus 100, so that in a patient of 50 years of age, no attempt should be made to depress the blood sugar much below 150 mg per 100 c c of blood—Ed.]

There are many *electrocardiographic evidences* that diabetes produces cardiac damage. An interesting study is reported by K. S. Smith and R. A. Hickling (*Lancet* 1:501 (Mar 5) 1932), in which they took successive electrocardiograms through the period of treatment of 20 diabetics of all ages. These were at first at intervals of a few days, and later of weeks and months. The tabulated results showed that the most pronounced change occurred in patients below the age of 40, the T waves being commonly flattened in leads I and II and often diphasic in Lead III. Increasing amplitude of the T waves in Leads I and II, and the substitution of an upright for a diphasic T wave in Lead III were the effects most frequently observed during treatment. In 2 patients, inversion of the T wave in all leads was recorded at the outset. All these changes disappeared progressively during treat-

ment, whether by diet alone or by diet and insulin. The most uniform change and restoration was observed in Lead II, while the T wave in Lead III was more easily influenced by treatment and less stable in its form and direction. Other occasional electrocardiographic changes occurring during treatment were progressive diminution of the P wave and progressive lessening of slurring in the Q-R-S complexes. The causal factors underlying the changes described were considered under the following structural and metabolic heads: (1) coronary sclerosis, (2) coronary intimal fatty deposition, (3) abnormal metabolic products, and (4) defective nutrition of the myocardium. On the basis of their observation, the authors conclude that the electrocardiographic changes produced by diabetes represent mainly a parenchymatous damage to the heart resulting from defective nutrition. Coronary disease, whether sclerotic and permanent or of an early reversible fatty type, probably occupies a subsidiary position in the production of abnormal electrocardiograms.

SYMPTOMATOLOGY.—The association of *hypertension* in diabetes has been a subject of much difference in opinion for the last few years. There have been many articles written which would tend to indicate that the blood-pressure was higher in diabetes than in normal individuals. H. J. John (*Ann Int Med* 5:1462 (June) 1932), in a very comprehensive and complete survey of the subject, reports his observations in 1828 diabetics and his conclusions are that blood-pressure in the nondiabetic rises proportionately higher in cases of obese individuals than in cases of normal weight. He has found this to be about a 12 per cent increase and a reduction in weight in these cases is usu-

ally followed by a reduction in the blood-pressure. In diabetics, he found in this series that the blood-pressure was the same as would be expected in normal individuals below and including the fourth decade. Above this, there was a greater incidence of high blood-pressure in the diabetic. In cases in which hyperthyroidism is associated with diabetes, as would be expected, there is a greater incidence of hypertension. He found in cases of hypertension in which a glucose tolerance test was done that 39 per cent showed glycosuria in the presence of normal glucose tolerance curves and that 55 per cent showed no glycosuria in the presence of diabetic curves, and concluded that there is a definite relationship between hypertension and diabetes and that hypertension itself may alter the renal threshold.

COMPLICATIONS.—The association of diabetes mellitus and *thyrotoxicosis* has been frequently noted and there are many reasons for believing that hyperactivity of the thyroid results in pancreatic derangement. With this in mind, it is interesting to read the report of Albert Weinstein (Bull Johns Hopkins Hosp 51 27 (July) 1932) in which he reports diabetes as occurring in 2 cases of myxedema. Weinstein gives a very thorough review of the literature in this interesting coincidence. There have been cases reported which developed myxedema after having had diabetes for some few years and in these, with the development of the hypothyroidism, the diabetes disappeared. It may be imagined, therefore that had these cases not had myxedema, their diabetes would have been of extreme severity and, indeed, Weinstein found that when he treated these cases with thyroid extract the diabetic symptoms became greatly accentuated.

In studies of 160 diabetic patients, O Ferger (Ztschr f klin med 119 81 (Dec 18) 1931) found that in a large majority of cases, as many as 20 per cent, he was able to demonstrate some present or past disorder of the *gall-bladder* or *liver*. He feels that these 2 conditions render the spread of an infection from the gall-bladder to the pancreas, by way of the lymphatics, a very easy method. He also feels that diabetes may develop secondary to duodenal ulcer for the same reason.

[It has been our personal feeling, as a result of the observation of a considerable number of gastrointestinal cases, that there is a very definite and mild type of diabetes which may be due to a concomitant pancreatitis secondary to disease of the gall-bladder and gall-ducts and that this type of diabetes is frequently improved by treatment directed at the gall-bladder condition — Ed.]

TREATMENT.—A survey of the literature and the publications from the larger clinics throughout the world all show a tendency to shift from a low carbohydrate—high fat type of diet to a moderately high or extremely high carbohydrate—low fat diet. It is interesting to note that men who formerly felt that this type of diet was unsatisfactory are now becoming enthusiastic about its use and are finding that the amount of insulin required with this type of diet is less than that required with the former types of diets. Surveys of this method of treatment and endorsements of its use are made by I. M. Rabinowitch (Canad M. A. J 26 141 (Feb) 1932); O Bang (Norsk mag f Lægevidensk 93:522 (May) 1932); G Czoniczer and E Kolta (Med Klin 28 752 (May 27) 1932); S C. Dyke (Lancet 1 978 (May 7) 1932); Stolte

(Ztschr f klin Med 27 831 (Feb 24) 1932), and A S Melcer (Polska gaz lek 11 89 (Jan 31) 1932). A very careful survey of this field has been reported by J H Barach (J A M A 98 1265 (Apr 9) 1932), who has taken 50 cases for each of the years from 1926 to 1931, inclusive, and has charted their carbohydrates and fat allowance and insulin requirement. His patients at the end of 1931 averaged 154 grams carbohydrates and 110 grams fat. The insulin requirement with this had increased but 3 units over 1926, when the carbohydrate allowance was 94 grams and fat 144 grams. He has found that with the higher carbohydrate rations the patients are satisfied and have little desire to overstep their diet, and that these patients are more easily kept sugar-normal, he feels also that the diabetic patient tolerates carbohydrates better than fat and that gram for gram, carbohydrates throw less strain on the metabolism of the diabetic and that with this higher type of diet the danger of acidosis is greatly reduced.

The fact that insulin has to be given hypodermically has led to the search for other substances which might be given by mouth to aid in the sugar metabolism. **Myrtalin** and **synthalin** are 2 of the substances which have received the greatest publicity in the past few years and which have been abandoned by most of the men particularly interested in diabetes as being valueless or dangerous. It is somewhat unusual, then, to read in an article, A T Todd, W P. Brinckman and J R E Sansom (Practitioner 128 531 (May) 1932) that their experiences with **synthalin** are still satisfactory. They recommend that the **synthalin** be taken 10 mg. ($\frac{1}{8}$ grain) twice daily, that the patients be

kept on a liberal carbohydrate diet and that **decholin** or other bile salt preparation should also be given, and in addition, some **phosphate mixture** be added to the treatment. Unfortunately, the article does not give enough data to determine whether or not these patients develop evidence of kidney irritation and nephrosis, which were frequently seen in the cases treated in this country. There is also insufficient data to determine whether or not there is any liver damage with its extended use.

Liver therapy has been further tested, following the rather encouraging reports that came out about its use in 1930. E L Sevringhaus (Ann Int Med 5 1387 (May) 1932) reports further negative results in a very extensive and carefully controlled series of cases. He failed to find any evidence that there was an antidiabetic activity in the liver mixture or alcoholic extract of liver, or in preparations that had been prepared from the press or in a powder precipitated from an aqueous liver extract.

Very similar results and conclusions were obtained by H Steinitz (Klin Wchnschr 11 192 (Jan 30) 1932) in work on 36 diabetic cases, so that we are forced to believe from all the recent literature that there is probably no active antidiabetic fraction in liver.

In spite of the ease of satisfactory diabetic control by diet and insulin, there are still abortive attempts made to treat it surgically or roentgenologically by attacking the suprarenal bodies. A Ciminata (*Ibid* 11 150 (Jan 23) 1932) reports a summary of his results in this field on experimentally produced diabetes and also the case of a woman, aged 50, with severe diabetes in whom the left suprarenal body was denervated,

following which the sugar content of the blood decreased considerably for several months. It then increased somewhat, but never reached the pre-operative level. The author advances the thought that denervation of both suprarenal bodies would bring still better results. Unfortunately, insufficient data is given to draw convincing conclusions as to the severity of the diabetes and whether or not the case had adequate treatment before operation was done. Certainly, until some better proof is presented, routine denervation of suprarenal bodies should not be attempted.

Much along the same line, L. Langeron, R. Desplats and J. Bera (*Presse méd* 39 1709 (Nov 21) 1931) report the results of their experiences with radiation of the suprarenal region in the treatment of diabetes. They describe the results obtained in 11 patients and conclude that in diabetes of moderate intensity, interesting abatement in glycosuria may be obtained through irradiation of the suprarenal region and without inconvenience. It is not indicated in severe diabetes or in cases with acidosis. They feel that the results of this method of treatment are equivalent to those obtained with denervation of the suprarenals.

DIABETIC GANGRENE — E. Downie (Australian and New Zealand J Surg 1 393 (Mar) 1932) states that while the use of insulin has prolonged life in diabetes, modern experience has demonstrated an increase in the vascular changes associated with the condition. *Arteriosclerosis* resulting in *gangrene* is a frequent complication. This is usually limited to the muscularis coat of the arteries and consists of occlusion of the lumen with invasion of the intima by adventitious vessels.

Thrombosis with canalization and the development of a collateral circulation has been noted in many autopsy specimens. A *chronic inflammatory process* in the vessel wall involving the muscular as well as the intimal coat has also been observed. The author shows the different stages of arterial disease by photomicrographs.

Of the factors predisposing to the development of diabetic gangrene, vascular changes are most important. Lowered resistance of the tissues to infection and trauma may allow gangrene to develop from an apparently trivial injury. Many methods, including the Matas and Moszkowicz procedures and the use of the Pachon oscillometer, are of aid in determining the degree of impairment in the vessels. While they are not completely adequate, they are of value in selected cases.

Symptoms.—The development of gangrene may be preceded by pain or numbness and a sensation of bursting in the extremities, according to Downie (*Ibid*). These may bear a definite relationship to exercise. As the arterial changes are gradual, the symptoms are not of sudden onset. With the development of gangrene the pain becomes constant and severe. In the presence of infection there are symptoms of toxemia and sepsis. The area of infection may extend some distance from the gangrenous area.

Prophylaxis and Treatment.—Downie (*Ibid*) states that patients with arterial changes should be impressed with the importance of proper footwear and care of the feet. The diabetic state should be controlled by diet and insulin. An area of dry gangrene should be protected with antiseptic dressings and treated with heat. Heat is best applied by means of an incandes-

cent bulb The indications for amputation are

- 1 Spreading gangrene unaffected by any form of treatment

- 2 Septicemia

- 3 Failure of response to diet and insulin due to the presence of severe infection, and

- 4 Persistent and intractable pain

The site of amputation must be carefully selected and the patient prepared properly for the operation in order to prevent shock and acidosis The operation is best performed under spinal anesthesia unless this is contraindicated The use of the tourniquet has been abandoned Speed with minimal trauma to the tissues is important Adequate flaps with no tension must be provided After the operation the diabetic state must be controlled by the administration of insulin in quantities almost sufficient to produce hypoglycemia

E L Eliason and V W M. Wright (S Clin North America 11 1275 (Dec) 1931) present a résumé of their treatment of diabetic gangrene In 69 per cent. of their recent cases a mid-thigh amputation was done and they state that their preference for this is because:

1. Multiple operations increase the mortality

- 2 It is generally useless to amputate a foot or a leg when the arteries immediately above it are hopelessly diseased

- 3 From the economic and functional points of view, a thigh stump is preferable

- 4 The majority of their patients, because of advanced age and associated complications, were rarely engaged in useful occupations, and they feel that the effect of saving them a few inches of extremity which will never be used is unwise

COMA.—*Pathological Physiology*—The height to which fasting blood sugar may rise in diabetic coma is of considerable interest, but there is no definite relationship to the depth of the coma in the majority of cases It is of some interest to review 3 cases reported by C J Haines and R Davis (J A M A 99 24 (July 2) 1932) These cases all had admission blood sugars above 1000 mg per 100 cc of blood and recovered without any undue complications on the ordinary routine for diabetic coma These authors still feel that sodium bicarbonate is indicated in diabetic coma

A Lyall and A G Anderson (Quart J Med 1 353 (April) 1932) discuss the significance of alteration of the *blood urea* and present a series of 25 cases of diabetic coma observed in 17 patients They have rejected from the record any case in which there was demonstrable cardiovascular disease or preëxisting renal involvement Eleven of the patients were under 40 years of age and only 1 was over 60 Twelve of the cases had been under their observation at the Aberdeen Royal Infirmary for a number of years They found that the blood urea was elevated in 19 cases and that in 13, this value was between 40 mg and 100 mg and in 6 cases, above the latter figure When recovery took place the return of blood urea to normal was usually rapid

One patient was observed in 3 attacks of coma During the first observation, the blood urea was normal with blood sugar of 562 mg During the second attack, the blood urea increased to 94 mg and returned to normal in 4 days At the third period of coma the blood urea value was 120 mg and did not return to normal within 1 month, although

shortly after this time normal figures were obtained

It is important to note that blood urea values may show considerable variation during active and effective insulin therapy. In 3 cases an actual increase was observed during this period, coincident with a decrease in the blood sugar value and a general improvement in the patient's condition. They feel that a moderate degree of nitrogen retention in the blood in the early stages of coma is not necessarily of grave significance, but that considerable prognostic importance can be placed upon the retention of any marked degree. In the group of 13 cases in which the blood urea was below 100 mg, there was only 1 death, whereas in 6 cases in which the blood urea was over 100 mg, there were 4 deaths. Combining their series with that reported by Labbé and Boulin, they obtained a series of 51 cases of uncomplicated diabetic coma with a definite increase in the blood urea. In 29 of these cases where the increase was less than 100 mg, there were 6 deaths. However, in the group above 100 mg, 14 out of 22 patients succumbed.

The cause of this increase in diabetic coma they feel has not been explained. It is evident that the hyperglycemia itself has no influence on the urea content of the blood, as it has been definitely proven that there is no relationship between the blood sugar and blood urea values. Insulin therapy appears to have no effect on raising the blood urea, although from a theoretic standpoint it might possibly increase the nitrogen retention. The increase in urea is, then, considered as a manifestation of the acidosis itself and they feel that the cause for it must be searched for in the physiology of the coma. In diabetic acidosis a reduction in the volume of the

blood plasma with a relative increase of its chemical constituents would bring about a rise in the blood urea and this dehydration is a well recognized occurrence.

It is probably brought about by polyuria previous to the onset of the coma, loss of fluid by vomiting, lack of fluid intake and another theoretical cause, *viz*, that of the excessive secretion of water vapor by hyperpnea. They also feel that in certain cases the increase in the blood urea was due to the depletion of the blood plasma and the tissue chlorides following a prolonged acidosis and found that in a few cases the urea could be brought back to normal by the administration of saline. Then too, any degree of renal failure superadded to these factors accentuates the rapidity of nitrogen retention and there is ample evidence of implication of the kidneys in diabetic coma. They feel, therefore, that the *blood urea is a test of great importance in the prognosis of diabetic coma*.

Color Index—R. D. Lawrence, H. A. Lucas and R. A. McCance (Brit. M. J. 2.145 (July 23) 1932) report what they believe to be a new observation in diabetic coma, *viz*, an extremely high color index. The recognized cytological changes in the blood during coma are (1) the concentration of all the formed elements of blood due to dehydration which results in an increased red cell count and an increased hemoglobin, but a normal color index; (2) a color index often of considerable magnitude accompanied by a shift to the left in the Shilling count. This, however, may be found in a severe ketosis of any form. They report 3 cases of severe diabetic coma in which the color index was high, and feel that while there have been an insufficient number of cases studied for

a very accurate conclusion, the explanation of this phenomena may lie in a true megalocytosis and that this megalocytosis may be due to stimulation of the bone-marrow by the ketones in the blood. The leukocytosis seen in diabetic coma is another evidence of this stimulation.

Treatment.—The importance of the use of dextrose in the treatment of diabetic coma is stressed by H. P. Hims-worth (*Lancet* 2 165 (July 23) 1932). He states that unless this substance is present in sufficient amounts, insulin is relatively impotent and he feels, as do some of the workers in this country, that the fundamental idea is to give dextrose covered by a certain amount of insulin, rather than a certain amount of insulin covered by a given amount of dextrose. His routine is to put the patients to bed and keep them warm. Water is given freely and every 3 hours the patient is given 25 units of insulin subcutaneously and 15 minutes later, 50 grams ($1\frac{2}{3}$ ounces) of dextrose in solution given by mouth. Specimens of urine are examined before each injection of the insulin. He has found that when the patient is first seen the urine will give a dark red ferric chloride reaction which is usually accompanied by a copious white precipitate of phosphates, the more delicate nitroprusside reaction for acetone bodies will be positive and will become blue-black on standing, and sugar will be present in sufficient amounts to reduce Benedict's qualitative solution completely. He then lists the changes as they occur:

1. The white precipitate given by ferric chloride either does not occur or comes down in greatly diminished amounts.

2. The ferric chloride reaction becomes negative.

3. The nitroprusside reaction becomes negative.

4. The urine becomes sugar-free.

As soon as this occurs, it is his custom to put the patient on a light diet of about one-third his normal caloric requirement and made up almost exclusively of carbohydrates divided into 3 meals and 1 unit of insulin is given for each 3 grams (45 grains) of carbohydrate.

In addition, between meals and after the evening meal, 30 grams (1 ounce) of dextrose and 10 units of insulin are given. After the patient is acetone-free for 48 hours, the author increases the diet so that every unit of insulin is covered by 4 grams (1 dram) of carbohydrate and shortly after this, the following adjustment of diet and insulin dosage is entered on. With this method the writer states that blood sugar determinations are not only unsatisfactory, but their significance is entirely fictitious and from his reports the routine outlined has proven very satisfactory in his cases.

H. W. Fullerton, A. Lyall and L. S. Davidson (*Ibid* 1 558 (Mar 12) 1932) report a case that was admitted to the hospital with the classical symptoms of diabetic coma. The usual treatment for diabetic coma was given and in spite of the fact that the patient was relieved of the symptoms of coma, anuria developed and an increasing blood urea nitrogen occurred. They felt that the patient had passed from diabetic coma into what they feel might be described as "diabetic uremia." The usual remedies for stimulating urinary secretion were used without success. They then gave the patient a 25 per cent solution of dextrose and were gratified to find that in 2 hours, 8 ounces (240 cc) of urine were passed and

during the rest of the day, 20 ounces (600 c c) Then intravenous glucose was continued for the next 3 or 4 days and the patient, whose blood urea had reached the startling figure of 230 mg, improved and blood chemistry returned to normal in 9 days

DIABETES MELLITUS IN CHILDREN.—ETIOLOGY.—

Heredity is generally considered to be one of the etiologic factors in diabetes mellitus If one distinguishes between "familial" and "hereditary," as Joslin ("Treatment of Diabetes Mellitus," p. 142, Lea and Febiger, Philadelphia, 1928) does, then the "familial" cases can only be correlated with an hereditary factor on the basis that the transmission is from unknown ancestors ("Familial" is used to include instances of diabetes in brothers, sisters and cousins, but not in the parents, uncles, aunts or grandparents "Hereditary" connotes the presence of the disease in some ancestor) Urban Hjarne (Acta pædiat 13 225 (June 6) 1932) adds another instance of "familial" diabetes He reports the occurrence of diabetes mellitus in 3 sisters Careful examination of the mother, father, and the other 2 children (both boys) revealed no evidence of diabetes, nor was there a history of diabetes in the grandparents or in any other known relative

The same author also reports an instance of "hereditary" diabetes mellitus in father and son The interesting feature in this case is the report of a glucose tolerance test on the son 6 years before the onset of the diabetes The fasting blood sugar was 0.077; 40 minutes after the ingestion of 85 grams of sugar the blood sugar rose to 0.188, and 2 hours later was 0.120 This curve shows a slight retardation in the return

to the fasting level and is possibly an early evidence of decreasing carbohydrate tolerance

Glucose tolerance tests were made in 6 brothers and sisters of diabetic patients by H Sehestedt (Deutsches Arch f klin Med 172 228 (Dec.) 1931) In 3 of these, the elevation of the blood sugar after the ingestion of glucose was rather high but the returns to the fasting level were within normal limits The other 3 showed a delayed return to the fasting level The author believes that the evidence obtained justifies his examining these 6 children for diabetes at frequent intervals

PROGNOSIS.—The results of 8 years' experience in the treatment of diabetes mellitus with insulin in Norway are reported by K U Tover (Proc Fifth Northern Pædiat Cong Acta pædiat 12 193 (Apr. 28) 1932) Of 47 children on whom treatment was begun between 1923 and 1926, 17 or 36 per cent were dead at the end of 1927 Of these, 4 refused insulin treatment, 7 were irregular in following their diet and insulin therapy; 5 died in coma associated with untreated infections, and 1, in coma in connection with a fractured femur Of the 30 children remaining in 1927, 7 died during the next 4 years None of these were regular in their insulin administration and 3 died in coma during acute infections.

At the time of writing this article, 23 of the children were still alive, and of these, 10 were fairly well-controlled and 13 only irregularly so. This mortality rate is high for the "insulin period" but may be justified, in part at least, by the conditions under which it was necessary to treat many of these children The mortality was higher in the rural than in the urban districts and higher among the less intelligent class This

type of report illustrates exceptionally well, not only the need for adequate care, supervision and treatment during infections, for the diabetic child, but the importance of adequate education and the development of therapeutic autonomy in the child and his family.

Reports of recovery from diabetes mellitus are not only rare, but in most instances are distinctly open to question. R. D. Lawrence and R. A. McCance (*Arch Dis Childhood* 6 343 (Dec) 1931) report a case of gangrene in an infant with, what they term, "temporary diabetes." This infant, at least, had the typical symptoms of diabetes during the acute stage, *i.e.*, wasting, glycosuria, and hyperglycemia (0.6 per cent). The short duration of the diabetic findings (4 to 6 days) and the small amount of insulin given ($\frac{1}{2}$ to 1 unit at 4-hour intervals and then twice daily for only a few days) leaves this a doubtful case of diabetes mellitus.

TREATMENT.—Perhaps the trend toward the use of a "normal diet" in the treatment of diabetic children is the most significant recent development. While the percentage composition of the diet as prescribed by different clinicians differs somewhat in the degree to which such a diet is approximated, in most instances there is a distinct increase in the carbohydrate content and at least a relative decrease in the total daily fat intake. Unquestionably this is due to the more universal use of insulin, but, paradoxical as it may seem, some children not only do not require an increase in their insulin dosage when the carbohydrate content of their diet is increased, but actually can maintain a glycemic equilibrium on a decreased dosage. However, another factor which influences insulin requirements, and in regard to which the medical profession

is gradually becoming conscious, is the amount of exercise or muscular activity which the child performs. In most instances increased exercise lessens the need for insulin. Most clinicians who treat diabetic children have observed that when children, who have had their diet and insulin regulated in the hospital, go home, they frequently have insulin shocks and need to have their insulin dosage reduced.

H. Rau (*Deutsche med Wchnschr* 58 171 (Jan 29) 1932) advises adequate diets for diabetic children with comparatively high carbohydrate intake and stresses the need for adequately distributing the insulin dosage throughout the day so that a metabolic equilibrium is maintained. It is suggested that a diet with large amounts of carbohydrates may result in increased glycogen storage, which will serve as a protection against the development of hypoglycemia.

There is a swing toward a use of a high carbohydrate—low fat diet for children as well as for adults and this one factor has seemed to make the diabetes of children a less pitiful one to handle. Whether it is felt that the increased carbohydrate stimulates further increase in the production from the pancreas of the diabetic, or whether, as some investigators believe, the low fat content of the diet liberates further endogenous insulin to take care of the carbohydrates, it is obvious clinically that with the higher allowance of carbohydrates the insulin requirement is not increased over that of the low carbohydrate diet.

A rather interesting paper by H. C. Jamieson (*Canad M A J* 27 389 (Oct) 1932) recounts his experience with this type of diet in 50 diabetic children. He starts them on a diet of 100

grams carbohydrate, 60 grams protein, and 40 grams fat, and as the sugar disappears from the urine, adds 25 grams of carbohydrate a day to the diet and further increases the protein, leaving the fat at the original low level. This type of diet, he feels, has the advantage of more nearly approximating the diet of a normal child. Because of the high antiketogenic-ketogenic ratio, there is very little danger of ketosis developing. The patients feel better and are more cooperative on this type of diet and it also does away with the necessity for devising substitutes for breadstuffs. His experience has been that with such a diet the tolerance for carbohydrate is more than doubled during the period of observation.

Pricilla White in an admirable book ("Diabetes in Childhood and Adolescence," Lea and Febiger, Philadelphia, 1932) discusses the basal requirements and the partition of diet in the diabetic child. She points out that the effect of the partition upon the growth and development of the child is of far-reaching importance, as well as its effect on the efficiency of the pancreas and the functional strain to which the island tissue may be put when one type of food is increased and another decreased.

It has been her practice to give from 25 to 50 per cent of the calories in the form of carbohydrates, from 10 to 20 per cent in the form of protein, 35 to 65 per cent in the form of fat, which would result in a **high carbohydrate-low fat type of diet**. In the same publication, she discusses the *fat metabolism* in the diabetic child and feels that the blood cholesterol is a very accurate index to the total lipide. She has found that the average blood cholesterol in her group of children was 230 mg. She feels that the control of the

cholesterol and its reduction to normal is very important in preventing complications of childhood, and lists among those conditions in which high blood cholesterol values were found, acidosis, coma, xanthomata, infections, cataract, tuberculosis and arteriosclerosis, and concludes that the excess cholesterol in the blood is an exceptional finding in diabetic children today, that there is no close relationship between the blood sugar and the plasma cholesterol; that the duration of the disease is without significance as far as the cholesterol is concerned.

The use of a liberal dietary intake would be limited to cases of, what they term, "total diabetes" by E. Walenta and M. Trusen (*Monatschr f. Kinderh.* 54: 185 (Aug. 10) 1932). In such instances, they give a **mixed diet** with sufficient insulin, which usually is from 30 to 70 units per day. With this plan they have observed that these children with "total diabetes" do not go into coma, even during infections. [With such experience, one wonders why these authors insist on maintaining more restricted dietary measures in their milder diabetic patients.—Ed.]

That the effect of different fruits and **vegetables** upon the blood sugar is not entirely due to their quantitative carbohydrate content, but that it depends upon other factors as well, has been shown by A. Athanasiou (*Deutsche Arch. f. klin. Med.* 172: 358 (Jan. 8) 1932). This effect is determined by the blood sugar curves after the administration of the different foods and is termed their biologic value. Different kinds of nuts, blackberries (raw or cooked), raw peaches, raw Italian plums, cooked apples and beets were found to affect the blood sugar least. Such fruits as pears, grapes, bananas, oranges and

whortle berries had a medium biologic value. Apricots, dried and cooked peaches, raw and cooked currants, pineapple, raw cherries and dried and cooked figs caused a more marked increase in the blood sugar level.

Treatment of Coma—The observations of the treatment of diabetic coma in 70 children, 69 of whom recovered, are reported by E. P. Joslin, H. F. Boot, P. White, W. R. Jordan and H. M. Hunt (*M. Clin. North America* 15: 829 (Jan.) 1932). Coma occurs more often in the child than in the adult because dietary breaks are more frequent and there is a greater susceptibility to infection. Starvation may also be an infrequent cause of coma. In the differential diagnosis of diabetic coma, insulin shock and an acute surgical abdomen must be considered. The most important differential points between insulin shock and diabetic coma are given as follows:

1 In insulin shock, consciousness is lost rapidly; in coma the loss is gradual.

2 Insulin shock is due to an increase of insulin, reduction of the diet or an increase in exercise. Diabetic coma results from omission of insulin, lapse of dietary control, or an infection.

3 The skin in insulin shock is moist and pale, in diabetic coma it is dry and flushed, except in late stages, when there is pallor.

4 In shock the breathing is normal or shallow, in coma, hyperpneic.

5 The pulse is full and bounding in shock, while in coma it is weak and rapid.

6 Vomiting is exceptional in shock and, if it occurs, usually follows unconsciousness; it is the rule in coma and precedes unconsciousness.

7 Convulsions are the rule in shock, whereas if they occur in coma, it is

almost invariably only when the patient has received alkalis.

The diagnosis is established by the laboratory, since in shock the blood sugar is 60 mg or below, while it is elevated during coma. The carbon dioxide content of the blood in coma is 20 volumes per cent or below, in shock it is normal or elevated.

The importance of promptness in the treatment of coma is emphasized. Insulin should be given immediately. The dose of insulin in the treatment of their cases varied from 32 to 840 units, with an average of 145 units within the first 24 hours of treatment. Children who have not had insulin should receive 5 to 10 units every half hour, dependent upon the age of the patient and the severity of the coma. Diabetics of longer standing are given larger doses. Physiologic salt solution should be given, subcutaneously and intravenously, in sufficient amounts to combat dehydration. Repeated gastric lavage and enemata are employed to combat loss of gastrointestinal tone, as evidenced by a dilated stomach.

DIARRHEAL DISEASES IN CHILDREN.—ETIOLOGY—A

new approach to the etiology and treatment of infantile diarrhea associated with symptoms of acute intoxication has been suggested by K. Dodd, A. S. Minot and H. Casparis (*Am. J. Dis. Child.* 43: 1 (Jan.) 1932). Confronted with an unusually severe epidemic of alimentary intoxication in the summer of 1930, in which the usually accepted methods of treatment were vigorously used without avail, a determined effort was made to isolate the toxic factor. Because the clinical behavior of the infants (bloody vomitus, diarrhea and acidosis associated with nervous hyper-

excitability or prostration) was so similar to the intoxication of dogs with increased *blood guanidine*, as observed by Minot and Cutler, such a study was made in infants who had the above symptoms

The blood sugar level was first determined, since in dogs a hypoglycemia is a frequent concomitant of guanidine poisoning. Having obtained several low blood sugar values in intoxicated infants, they proceeded to make blood guanidine determinations. In 5 infants with severe alimentary intoxication, the blood guanidine was found to be elevated comparably with that found in dogs with guanidine poisoning. Since it had been demonstrated that dogs could be protected from guanidine poisoning and even cured by persistent calcium therapy, these patients were given calcium gluconate intravenously and intramuscularly. Cases 2, 3 and 4 recovered, and both cases 1 and 5 showed improvement of the intoxication symptoms, although both died of other causes. In case 1 a subdural hemorrhage was found at autopsy and case 5 died of bronchopneumonia after recovering from the symptoms of intoxication.

While the authors are not willing to draw definite conclusions from these observations, nor even to say that the toxic factor is guanidine, they point out the striking similarities between these infants with alimentary intoxication and dogs with experimental guanidine poisoning, as well as the response of each to calcium therapy.

An unusual epidemic of *infectious diarrhea* occurring in a nursery for newly born infants is reported by M. Jampolis, K. M. Howell, J. K. Calvin and M. L. Leventhal (*Am J Dis Child* 43:70 (Jan) 1932). The infectious agent was apparently *B. mucosus*, pos-

sibly enhanced by symbiosis with an-hemolytic streptococci. *B. mucosus* was isolated from the nasal secretions, stomach contents, stools and intestinal mucosa in a large number of the cases. The general symptoms, severe intoxication, dehydration and prostration, were out of proportion to the diarrheal symptoms. Blood and pus were found in the stool in only 1 case. The relative absence of colon pathology, as observed at the necropsies, and the marked involvement of the small intestine were thought to account for the mild diarrheal manifestations. The usually accepted methods of treatment for anhydremic intoxication were of little value. The epidemic was controlled when 3 nursery maids, who were found to have almost pure cultures of *B. mucosus* in their throats and stools, were removed from the nursery.

Considerable emphasis has been placed upon the relationship of acute *otitis media* to gastroenteritis as an etiologic factor. That this view is far from being generally accepted is apparent from a study of the previous literature. Another clinical study, which seems to show that *otitis media* may be an associated disease but is not likely to be a causative agent of acute gastroenteritis, is reported by J. G. Druss (*Am J Dis Child* 43:356 (Feb) 1932). In his series of infants with acute intestinal disturbances *otitis media* was absent in most instances. In those cases in which it occurred, there was no consistency of the time of onset, which was in various instances, before, during, and after the onset of the gastroenteritis.

In contrast to the experience of Druss, is that reported by M. Morris and W. B. Smith (*Am. J. Dis Child* 44:964 (Nov) 1932). On the basis of 7 cases of *mastoiditis* associated with

gastroenteritis, which they observed over a period of 2 years, they make etiological deductions. In 6 of their cases postauricular drainage was instituted and of these, 5 recovered. They describe the typical course of the disease in their patients as follows: intestinal symptoms begin with the onset of the nasopharyngitis, the mastoiditis becoming evident several days later, at which time profound toxemia sets in. Operation on the mastoid followed the initial onset from 8 to 14 days. Definite improvement was observed within 24 hours after operation.

Allergy.—It is suggested by C M Pounders (Arch Pediat 49 314 (May) 1932) that certain instances of food intolerance which result in frequent, loose, irritating stools are due to food allergy. Two cases are reported which reacted in this way when fresh cows' milk was given and who were desensitized by the administration of small amounts, after cessation of symptoms, which followed a change to another food. According to the author, such disturbances are more apt to occur in infants with a family background of allergy. It is recommended that these infants be placed temporarily on a milk preparation, which has been "denaturized" by heating, evaporation, or drying, until a tolerance is established for the disturbing protein. As a means of *prophylaxis*, the pregnant woman with a family or personal history of allergy is advised against consuming large amounts of milk or any other single food for very long periods of time.

THERAPY.—The administration of fluids in adequate amounts to infants with acute diarrhea associated with the general manifestations of intoxication is generally recognized. In order to more intelligently follow the clinical

course of their patients and to more accurately determine the therapeutic indications, M W Poole and T B Cooley (Am J Dis Child 43 1101 (May) 1932) have made the following blood examination: serum-specific gravity, cell-plasma ratio (hematocrit tube), red cell count and hemoglobin determination and frequently total blood chlorides. The possibility of the misuse of blood transfusions is shown by their observations. This is not intended to convey the idea that blood transfusion is contraindicated in cases of alimentary intoxication, but when severe anhydremia is demonstrated by the blood examinations, the indications are those for dilution of the blood stream. This can be better accomplished by normal salt or weak dextrose solutions.

Methods for the continuous administration of fluids to children with severe toxemia and dehydration have been described by S Karelitz and B Schick (J A M A 99 366 (July 30) 1932) and by J M Brush (Am J Dis Child 44 366 (Aug) 1932). The technique, as described by Karelitz and Schick, is as follows:

The child is restrained on the bed and either the arm or the leg is fastened to a padded splint which, in turn, is attached to the bed. The vein (cubital or leg vein) is exposed under local anesthesia and a small cannula is inserted and tied in place by means of No 2 catgut ligatures. The apparatus is that which is ordinarily used for gravity intravenous therapy, together with a rectal drip bulb and a thumbscrew clamp. The amount of fluid given in a 24-hour period is calculated on the basis of 2 ounces (60 c.c.) per pound (480 grams) of body weight. During the venoclysis nothing is given by mouth for at least 12 hours, and oral administration may even be omitted for several days.

Brush uses the great saphenous vein in the midleg and, in place of a cannula, uses a section of a urethral catheter. This is cut at an angle and a stilette inserted. He claims

that the catheter is less likely to injure the vessel wall. The conduction tube is coiled on the lateral side of the leg to maintain the solution at body temperature. The rate of flow is regulated by allowing the solution to pass through a medicine dropper packed with gauze. The rate can be varied by the amount of packing used, and should be regulated before sterilization.

Sugar.—According to E. Schiff (Jahrb. f. Kinderh. 134:255 (Feb) 1932), it is not logical to attempt the treatment of diarrhea of alimentary origin by a reduction in the carbohydrate intake and a marked increase in that of protein. The essential factor in the therapy is to counteract the dehydration. The author has shown experimentally that exsiccosis results from a disproportion between the protein and the water content of the food and that it can be counteracted by excluding protein from the diet until the symptoms have disappeared. He bases the rationale of his carbohydrate diet on the decrease in the liver glycogen during dehydration and on the need of the growing child for carbohydrate. He recommends the use of a solution of 2 parts of 10 per cent rice gruel and 1 part Ringer's solution or whey, to which is added 6 to 8 per cent dextrose (computed for the total volume). An amount about equal to one-sixth of the body weight is given daily, but not in excess of 800 grams (26 $\frac{2}{3}$ ounces). Milk should be returned to the diet only with the greatest caution. The circulatory shock of acute toxemia should be treated with 10 per cent glucose in Ringer's solution intravenously.

The therapeutic plan of S. Rosenbaum (Deutsche med. Wchnschr. 58:293 (Feb 19) 1932) is not markedly different from that of Schiff. He advises an initial fasting period of from 6 to 12 hours. This is followed by the admin-

istration of a 10 per cent rice gruel, to which, after 24 hours, a 3 per cent sugar solution is added, and a 5 per cent solution on the third day. Egg yolk is added later, to increase the food value. Beginning on the fourth or fifth day, a milk mixture (protein milk, buttermilk or human milk) is gradually added. Water is given orally to combat the dehydration. Parenteral administration of fluids is reserved for cases of circulatory failure. Fresh fruit juices are advised as early as possible, in order to prevent scurvy. Blood transfusions are used in the severe cases, several small ones (20 c.c. each) are preferred to single larger ones. The constant use of oxygen in the treatment of the more serious cases is also recommended.

Apple Diet.—Further reports on the use of the pulp of raw ripe apples in the treatment of diarrheal disturbances continue to be favorable. G. Popovici (Rev. franç. de pédiat. 7:473, 1931) has had success with its use in the parenteral diarrheas, particularly in those of infectious origin. G. Fanconi (Acta paediat. 11:380 (Aug 20) 1930), who uses in addition to apples, such other fruits as bananas and oranges, suggests that one of the causes of failure may be due to too rapid addition of other foods to the diet. He advises the maintenance of 1 to 3 exclusive fruit days, followed by gradual addition of such foods as buttermilk, almond milk and potato purée and later purée of vegetables, protein almond milk and, finally, acid milk. He suggests particular caution in the return to whole milk and cereals.

A. Heisler (Acta. paediat. 11:379 (Aug 20) 1930) in an attempt to explain the action of the raw apples as an antidiarrheal agent, suggests that 2 factors may be operative, i.e., (1) the effect

of the tannic acid and, (2) the adsorptive qualities of the pulp

DIETOTHERAPY.—DIET, NUTRITION, AND INFECTION.

—From clinical observations Alfred F Hess (New England J Medicine 207 637 (Oct 13) 1932) concludes that the antirachitic factor, whether given as ultraviolet irradiation, as irradiated ergosterol, or as cod-liver oil, does not increase the immunity of infants to respiratory infections

Respiratory infections are not due to a lack of vitamine A and generally cannot be lessened by giving a diet rich in this factor, even when supplemented with cod-liver oil

The average infant seems to receive an adequate amount of vitamine A in its milk, judging by the fact that xerosis of the eyes is exceedingly rare, and that no gain in weight or increase in immunity is brought about by adding vitamine to the diet. The same seems to hold true for older children and adults, in view of the infrequency of night-blindness, the first sign of this deficiency

A lack of vitamine C may induce heightened susceptibility to infection of the respiratory tract. It may, however, induce merely local susceptibility without appreciable loss of systemic immunity. This peculiar phenomenon is manifested by the occurrence of typical nasal diphtheria, associated with virulent diphtheria bacilli, but a Schick reaction negative to highly potent solutions of toxin

ACID-BASE DIET.—Scientifically planned diets are concerned with the matter of balance, *i e*, the proper relationship between the fatty acid and glucose derivatives of the diet, between the acid and base values, and the

amount of nitrogen intake contrasted with the output

I A Manville and R Winchell (Northwest Med 31 464 (Oct) 1932) have again called attention to the importance of acid-base balance in the diet for certain conditions, and cite Sansum and his associates who employ basic diets for nephritis, and Lashmet and his colleagues who use a slightly acidic diet for the treatment of the disease. The acidosis diet for epilepsy is well known, and is based largely upon the dehydrating effort of the diet

In any of these diets, as pointed out by Manville and Winchell, which favor the development of an acidosis, whether due to the accumulation of ketone bodies or to an excess of acid-ash, a condition is produced in which there is a marked loss of fixed base and water from the tissues

Newburgh has indicated the importance of water balance as a determining factor in weight loss, in relation to which it was shown that the use of subcaloric diets alone would not necessarily cause a reduction in weight. However, when the diets were selected in a manner so as to produce an excess of acid, proper water losses would occur

In rickets and in tetany associated with certain forms of rickets, there is reason to believe that a preponderance of acid-ash foods will be beneficial, although it may be wise to vary an acid diet with a basic diet. Because of increasing interest in the subject and the activity shown in numerous clinics by many different observers with reference to acid-base diets, a better understanding of the values of these foods was kept in mind by the studies of Manville and Winchell. A chart bearing on the acid-base values of foods from various sources was made up in one table

TABLE I
TABLE GIVING EXCESS OF ACID OR BASE OF COMMON FOODS

Food Material	Household Measure (100-gram Portions)	Acid	Base
Almonds	100 nuts		12 00
Apples, fresh	1 medium		3 76
Apricots, fresh***	3 medium		6 4
Asparagus, fresh	8 stalks 4 inches		0 81
Bacon, smoked	10 slices	5 00	
Bananas	1 medium		5 56
Barley, pearled**	10 tbsps	10 30	
Beans, baked, canned**	½ cup		6 40
Beans, dried**	10 tbsps		17 20
Beans, lima, canned**	½ cup		9 23
dried**	10 tbsps		41 65
fresh**	½ cup		14 02
string, canned**	½ cup		2 66
fresh**	⅔ cup		5 39
kidney, canned**	½ cup		3 01
dried**	10 tbsps		8 62
Beef, brisket	1 slice 4½ x 2½ x ½	7 74	
chuck, average	1 slice 4½ x 2½ x ½	8 25	
corned	1 slice 4 x 3 x 1	7 64	
cross ribs, average	1 slice 4½ x 2½ x ½	7 81	
dried, salted, smoked	6 slices 4 x 5	14 80	
flank, lean	1 slice 4½ x 2½ x ½	10 37	
fore quarter, lean	1 slice 4½ x 2½ x ½	9 44	
fore shank, lean	1 slice 4½ x 2½ x ½	11 00	
heart	1 slice 2 x 3 x 1	9 14	
hind quarter, lean	1 slice 4½ x 2½ x ½	10 00	
hind shank, lean	1 slice 4½ x 2½ x ½	10 09	
hind shank, fat	1 slice 4½ x 2½ x ½	10 00	
juice	½ cup	2 20	
kidney, cooked	2 (cooked)	8 22	
liver	3 slices 2 x 1 x ¼	10 12	
loin	1 pc 2 x 3 x 2	11 15	
neck, lean	1 pc 2 x 3 x 2	10 64	
neck, medium	1 pc 2 x 3 x 2	9 77	
plate, lean	1 pc 2 x 3 x 2	7 67	
porterhouse	1 pc 2 x 3 x 2	10 81	
rib, rolled, lean	1 pc 2 x 3 x 2	10 00	
ribs, lean	1 pc 2 x 3 x 2	9 02	
ribs, fat	1 pc 2 x 3 x 2	7 30	
roast	4 slices 4½ x 2½ x ⅛	11 72	
round, lean	1 pc 2 x 3 x 2	10 52	
round, no visible fat	1 pc 2 x 3 x 2	11 49	
rump, fat	1 slice 4½ x 2½ x ½	10 20	
rump, lean	1 slice 4½ x 2½ x ½	8 07	
sides, lean	1 slice 4½ x 2½ x ½	9 60	
shoulder and clod, lean	1 slice 4½ x 2½ x ½	10 13	
shoulder and clod, medium	1 slice 4½ x 2½ x ½	9 82	
sirloin	1 slice 4½ x 2½ x ½	9 51	

* Benzoic Acid Some foods, such as cranberries, plums and prunes, have an alkaline ash but because they contain benzoic acid, which is secreted in the urine as hippuric acid, they increase the acidity of the urine

** Oxalic Acid The foods marked ** contain oxalic acid This acid is combined with calcium in the body to produce insoluble calcium oxalate crystals An appreciable amount of this acid taken into the body over a period of time will not only tend to deplete the body's reserve of calcium but will also result in renal injury due to trauma produced by the small crystals

*** Salicylic Acid The following foods contain salicylic acid as a methyl ester For this reason they might be employed with benefit in cases of rheumatism Apricots, blackberries, cherries, crabapples, currants, grapes, mulberries, oranges, peaches, pineapple, plums, raspberries, and strawberries

TABLE GIVING EXCESS OF ACID OR BASE OF COMMON FOODS (*Continued*)

Food Material	Household Measure (100-gram Portions)	Acid	Base
Beets, fresh, cubed**	$\frac{3}{4}$ cup		10 87
Blackfish	$\frac{3}{4}$ cup	9 31	
Bluefish	$\frac{3}{4}$ cup	9 73	
Bread, white, average**	3 slices $3 \times 3\frac{1}{2} \times 1$	7 10	
whole wheat**	3 slices $3 \times 3\frac{1}{2} \times 1$	7 31	
Buckwheat flour**	10 tbsps	6 89	
Butterfish	1 pc $4 \times 1\frac{1}{2} \times 1$	8 64	
Buttermilk	$\frac{1}{2}$ cup, scant		2 17
Cabbage, fresh	$1\frac{1}{2}$ cup		5 67
Catfish	1 pc $4 \times 1\frac{1}{2} \times 1$	7 31	
Carrots, fresh**	$\frac{3}{4}$ cup		10 85
Cauliflower**	$\frac{3}{8}$ cup		5 50
Celery, raw	4 stalks		7 81
Chard	$\frac{3}{8}$ cup		15 68
Cheese, cheddar	3 cubes, $1\frac{1}{2}$ inch square	5 45	
Cherries, fresh** ***	25 small, $\frac{3}{8}$ cup		6 09
Chestnuts, dried	40 roasted		12 80
fresh	40 nuts		7 58
Chickens, broilers	2 slices $4 \times 4 \times \frac{1}{8}$	10 76	
Citron	3 3 ounces		9 67
Cocoa**	14 tbsps		0 50
Cocconut, fresh	3 slices $2 \times 2 \times \frac{1}{2}$		7 05
Cod, dressed	$\frac{3}{4}$ cup, 1 pc $4 \times 1\frac{1}{2} \times 1$	5 55	
salted	3 3 ounces	12 60	
Corn, green	$\frac{3}{8}$ cup, 1 medium ear	1 81	
Cornmeal**	13 tbsps	5 35	
Crackers, soda	16	8 35	
Cranberries*	$\frac{3}{8}$ cup		1 72
Cream, 18 5 per cent fat	$\frac{1}{2}$ cup, scant		0 58
40 per cent fat	$\frac{1}{2}$ cup, scant		0 38
Cucumber, fresh	$\frac{1}{2}$ medium, 10 slices		7 91
Currants, dry*** **	$\frac{1}{2}$ cup		5 80
Dates	15 small		11 03
Eggs, whole	2 average	11 03	
whites	4	4 84	
yolk	6	25 00	
Eels, dressed	3 3 ounces	9 37	
Figs, dried**	6		100 93
Flounder, dressed	1 pc $4 \times 1 \times 1$	3 23	
Flour, wheat, entire	10 tbsps,	12 22	
patent	10 tbsps	9 64	
Fowls	2 slices $4 \times 4 \times \frac{1}{8}$	10 22	
Frog's legs	3 3 ounces	7 83	
Goose, young	3 slices $3 \times 3 \times \frac{1}{8}$	7 69	
Grapes***	1 small bunch, 24		2 69
juice***	$\frac{1}{2}$ cup, scant		4 00
Haddock, dressed	$\frac{3}{4}$ cup, 1 pc $4 \times 1\frac{1}{2} \times 1$	8 70	
smoked	1 pc $4 \times 1\frac{1}{2} \times 1$	11 62	
Halibut, smoked	1 pc $3\frac{1}{2} \times 2\frac{1}{4} \times \frac{1}{4}$	10 21	
steaks	1 pc $1 \times 2\frac{1}{4} \times 1$	9 02	
Ham, fresh, lean	2 slices $2\frac{1}{4} \times 1\frac{1}{2} \times \frac{1}{8}$	12 25	
medium fat	2 slices $2\frac{1}{4} \times 1\frac{1}{2} \times \frac{1}{8}$	7 42	
smoked, lean	4 slices $4\frac{1}{2} \times 4 \times \frac{1}{8}$	9 73	
medium fat	4 slices $4\frac{1}{2} \times 4 \times \frac{1}{8}$	8 33	
boneless	1 pc. $4\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$	6 96	
deviled	15 tsps	9 61	
Herring, smoked	$\frac{1}{2}$ fish, 1 pc $1 \times 2\frac{1}{4} \times 1$	18 00	
whole	1 small	9 57	
Koumiss	$\frac{1}{2}$ cup, scant		1 50
Lamb, breast	4 slices $4\frac{1}{2} \times 2 \times \frac{1}{8}$	9 42	
chop, broiled	1 large, or 2 medium	10 71	

TABLE GIVING EXCESS OF ACID OR BASE OF COMMON FOODS (*Continued*)

Food Material	Household Measure (100-gram Portions)	Acid	Base
Lamb, fore quarter	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	9 09	
hind quarter	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	9 75	
leg, medium fat	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	9 54	
loin	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	9 33	
neck	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	8 82	
shoulder	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	8 96	
side	1 pc $4\frac{1}{2} \times 2 \times \frac{1}{2}$	8 61	
tongue	3 3 ounces	6 50	
Lemons**	1 3		5 22
juice**	$\frac{1}{2}$ cup, 7 tbsps		4 31
Lentils	$\frac{1}{2}$ cup, 4 tbsps	5 16	
Lettuce**	10 leaves, 1 small head		7 36
Mackerel, fresh	1 pc. $4\frac{1}{2} \times 1\frac{1}{2} \times 1$	9 30	
salt	1 pc $4\frac{1}{2} \times 1\frac{1}{2} \times 1$	8 48	
canned	3 3 ounces	9 68	
Marmalade, orange** ***	$2\frac{1}{2}$ tbsps		3 44
Milk, condensed, sweetened	6 66 tbsps		4 51
unsweetened	6 66 tbsps		4 60
skimmed	$\frac{1}{2}$ cup, scant		1 83
whole	$\frac{1}{2}$ cup, scant		1 79
Molasses	$4\frac{1}{2}$ tbsps		59 43
Mushrooms	$\frac{2}{3}$ cup, or 4 large	3 90	
Muskmelons	$\frac{1}{2}$ small, $\frac{1}{2}$ cup cubed		7 59
Mutton, chuck	1 pc $3 \times 4 \times \frac{1}{2}$	7 64	
flank, medium fat	1 pc $3 \times 4 \times \frac{1}{2}$	8 00	
fore quarter	1 pc $3 \times 4 \times \frac{1}{2}$	8 62	
hind quarter	1 pc $3 \times 4 \times \frac{1}{2}$	8 06	
hind leg, lean	1 pc $3 \times 4 \times \frac{1}{2}$	9 61	
medium fat	1 pc $3 \times 4 \times \frac{1}{2}$	9 52	
loin, medium	1 pc. $3 \times 4 \times \frac{1}{2}$	7 85	
neck, medium	1 pc $3 \times 4 \times \frac{1}{2}$	8 56	
shoulder, medium	1 pc $3 \times 4 \times \frac{1}{2}$	8 74	
side	1 pc $3 \times 4 \times \frac{1}{2}$	8 33	
Oatmeal, rolled oats	1 cup, heaping	12 00	
Olives	10 large		56 96
Onions	3 medium		1 51
Oranges** ***	1 medium		5 64
juice** ***	$\frac{1}{2}$ cup, scant		6 20
Oysters, fresh solids	7 medium	15 15	
Parsnips	$\frac{3}{4}$ cup sliced, 1 large		11 81
Peaches, canned***	2 large halves		4 69
fresh***	1 2-inch		5 04
Peanuts	90	3 88	
Pears, fresh	1 small		3 54
canned	2 halves		1 72
Peas, canned	$\frac{1}{4}$ cup, scant, 4 tbsps		0 82
dried	12 tbsps		5 36
green	$\frac{1}{4}$ cup, 4 tbsps		1 20
Perch	3 3 ounces	6 32	
Pineapple, fresh***	1 slice $\frac{3}{4}$ inch thick		6 72
Plums* ** ***	3 average		6 18
Porgy, whole	3 3 ounces	9 39	
Pork, loin chop, lean	1 large	10 00	
medium fat	1 large	8 33	
salt, fat	1 cube 17 inches square	0 77	
side, not lard, and kidney	3 3 ounces	4 21	
shoulder, smoked	3 3 ounces	7 85	
sausage	1 pc $2 \times 3 \times 1$	6 36	
tenderloin	1 pc $4\frac{1}{2} \times 2\frac{1}{2} \times \frac{1}{2}$	9 42	
Potatoes**	$\frac{1}{2}$ cup 1, 2×4 inches		7 16
chips**	6 heaping tbsps		22 94

TABLE GIVING EXCESS OF ACID OR BASE OF COMMON FOODS (*Continued*)

Food Material	Household Measure (100-gram Portions)	Acid	Base
Potatoes, sweet	$\frac{1}{2}$ cup, 1, 2 x 4 inches		6 66
Prunes, dry * **	$6\frac{1}{2}$		24 24
Pumpkin	$\frac{1}{2}$ cup, cubed		1 46
Radishes	15 medium		2 86
Raisins	100		23 44
Raspberry juice** ***	$\frac{1}{2}$ cup		4 88
Rhubarb**	1 cup, 1 inch pc		8 54
Rice	10 tbsps	9 31	
flour	$6\frac{1}{2}$ tbsps	9 64	
Salmon, fresh	$\frac{3}{4}$ cup, 1 pc 4 x $1\frac{1}{2}$ x 1	11 02	
canned	$\frac{3}{8}$ cup, 1 pc 3 x $2\frac{1}{2}$ x $2\frac{1}{2}$	10 78	
Sausage, bologna	33 ounces	9 30	
frankfort	3, $4\frac{1}{2}$ -inch sausages	9 75	
summer	1 pc 3 x 2 x 1	12 50	
Sardines	12 small, 6 large	11 35	
Shad	$\frac{3}{4}$ cup, 1 pc 4 x $1\frac{1}{2}$ x 1	9 35	
Shredded wheat	33 biscuits	12 22	
Smelt	6	8 70	
Spinach**	$\frac{1}{2}$ cup, 4 rounding tbsps		27 03
Squash	$\frac{1}{2}$ cup, 4 rounding tbsps		2 81
Sturgeon, ant section	33 ounces	8 92	
Tomato, fresh**	1 medium		5 57
Trout, salmon	1 pc 4 x $1\frac{1}{2}$ x 1	8 84	
Turkey	1 pc 4 x 4 x $\frac{1}{4}$	10 58	
Turnips	$\frac{1}{2}$ cup, cubed, 4 tbsps, mashed		2 70
Veal, breast, lean	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 46	
medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 60	
shank, lean	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 19	
medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 10	
flank, medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 66	
kidney	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	8 37	
leg, lean	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 74	
medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 00	
liver	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 38	
loin, lean	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 13	
medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 82	
neck	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 14	
rib, medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 27	
rump	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 00	
shank, fore	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 26	
hind	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 24	
shoulder, lean	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	10 24	
medium fat	1 pc $4\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{2}$	9 79	
Walnuts	20	7 86	
Watermelon	$\frac{1}{2}$ cup cubed, 1 pc. $2\frac{1}{2}$ x 2 x $1\frac{1}{2}$		2 90
Weakfish	33 ounces	8 88	
Wheat, cracked	10 tbsps	11 71	
Whitefish	$\frac{3}{4}$ cup, 1 pc 4 x $1\frac{1}{2}$ x 1	11 34	

The table was prepared in the following way. The quantities of the various elements, calcium, magnesium, sodium, potassium (all basic elements), phosphorus, chlorine and sulphur (all acid elements) per 100 grams of edible portions of foods were determined and stated in terms of cubic centimeters of a

normal solution, hydrochloric acid or sodium hydroxide as the case might be.

In the foregoing table the foods are arranged in alphabetical order and tabulated in such fashion as to give the following information (1) 100 gram portions in terms of household measures, (2) excess acid and excess base in

terms of cubic centimeters of normal solution; (3) foods containing benzoic acid indicated by 1 asterisk, (4) foods containing oxalic acid indicated by 2 asterisks; (5) foods containing salicylic acid shown by 3 asterisks

Even though cranberries, plums and prunes contain benzoic acid and have an excess of base, in the diet they will tend to increase the acidity of the urine, due to the conversion of benzoic acid into hippuric acid

The ability of foods to combine with acid or base without changing their reaction is known as buffer value. Some foods have a low buffer value, while others have a high value. Foods of a low buffer value would be effective in conditions in which the gastric acidity is relatively high, such as in malnutrition, infectious and deficiency diseases, and other conditions in which there is a low amount of acid in the stomach. On the other hand, considerable benefit might be derived by using foods with a high buffer value in those conditions where it is wise to maintain the gastric acidity at a low level. A table by Kugel-mass and Greenwald (Table II) shows

TABLE II
BUFFER VALUE OF FOODS

Food Material	Cc N/10 HCl
Bacon, cooked	60
raw	296
Beans, green	14
Lima	18
Beef, cooked	97
juice	203
raw	173
Beets	08
Cabbage	08
Carrots	15
Chicken, cooked	85
raw	188
Corn meal	05
Eggs, raw	116

Food Material	Cc N/10 HCl
Kidney, cooked	101
raw	441
Liver, cooked	112
juice	291
raw	284
Milk, boiled	55
lactic acid	26
protein	26
raw	77
Oatmeal	07
Orange juice	51
Peas	13
Potatoes	25
Rice	09
Spinach	16
Spleen, cooked	129
raw	296
Squash	19
Tomatoes	23
Wheat, cream of	07
Wheatena	07

the buffer value of the foods in terms of amount of N/10 HCl required to change the pH of 1 gram of food 1 unit. Here it is noted that cereals and vegetables are low in buffer value, while milk, eggs and meat are high. Cooking and processing food seem to lower its buffer value. It is worth while bearing in mind that the low buffer value of fruits and vegetables, with their high base value, renders them particularly valuable in correcting disturbances of acid-base equilibrium.

From the large tables shown, it is found that foods may be divided in 3 large groups. Excess acid-ash foods: meat, fish and cereals. Excess alkaline-ash foods: most fruits, most vegetables, milk and some nuts, such as almonds. Also neutral foods: as butter, corn-starch, cream and, for the most part, most cooking fats and oils, and pure carbohydrates such as sugar and tapioca.

The use of the acid-base table will for the most part lie in those dietotherapeutic régimes where dehydration is de-

sired as in epilepsy, nephritis with edema and obesity

KETOGENIC DIET.—A study of the ketogenic diet over a period of years is beginning to evidence its value in the treatment of epilepsy, particularly of that of the child, and Barborka (Am Dietet Convention (Nov 10) 1932) gives the following, as the effects of the ketogenic diet, which should prove beneficial in the treatment of this disease

- 1 Aceto-acetic acid anesthesia
- 2 A shift of the acid-base equilibrium
- 3 Dehydration effect of acidosis
- 4 Basic elements of nerve tissue, water and fat

- 5 Extra- and intracellular fluid loss

In a survey, over a 10-year period, of epileptic cases where the ketogenic diet has been instituted as part of the treatment, Barborka found that 30 to 35 per cent of the cases were controlled, 35 to 40 were definitely improved; and 30 to 40 derived no benefit. Of the group which failed to benefit, 13 per cent did not develop ketosis and the remaining evidenced inadequate dietary procedure. Barborka expressed the opinion that this diet may be of use in the treatment of migraine, as the ketogenic régime covers the 4 theories which are associated with its cause, *viz*

- 1 Acid-base equilibrium
- 2 Allergy—protein poisoning theory
- 3 Dysfunction of liver and duodenum
- 4 Rôle of diet, *e g*, attacks having been noticed after an excessive amount of carbohydrate food (chocolate) was eaten. The ketogenic diet, being low in carbohydrate, would counteract this.

After a 5-year period, in a survey of migraine cases which had been placed on the ketogenic diet, he found that 30 per cent were controlled, 50 per cent

helped, and 20 per cent derived no benefit. Cases of chorea have had this diet included as part of the treatment, the value of it lying in the fact that its effects, as enumerated under the treatment of epilepsy, all tend to produce sedation. Hence, in this condition, as in epilepsy, the dosages of the depressant drug can be greatly reduced.

By the use of the ketogenic diet, H. F. Helmholz (J. A. M. A 99 1305 (Oct 15) 1932) has observed that in cases of stubborn urinary infections, the urine can be rendered bactericidal for many organisms, particularly the frequent invader, the *colon bacillus*. The factors involved are the lowering of the pH below 5.6 and the production of ketonuria, the latter being the more important, although dependent for its maximal action on synergistic aid from the acidity and from other, as yet, undetermined substances.

The ketogenic diet in the K:AK ratio of 4:1 is usually sufficient to produce the desired ketosis and a urinary pH of 5.5 or under. If, however, the urinary acidity is not obtained, 1 to 3 Gm (15 to 45 grains) of ammonium chloride per day will prove effective. Three cases with major urinary anomalies were rendered infection-free by this treatment.

The ketogenic régime is usually preceded by a fasting period varying from 3 to 7 days, during which time only broths, water, bran wafer (without food value) and the juice of 2 oranges (8 oz) are given daily. This period is an aid in establishing ketosis. In the construction of the diet, the first principle is to have the total amount of food correspond closely to the total energy requirement of the patient. In the adult, 16 calories per pound body weight is estimated. In the child, due to growth

and activity, a demand of 60 to 75 calories is considered. Protein allowance may vary $\frac{1}{4}$ to $\frac{1}{2}$ gram per pound of body weight. The carbohydrate allowance is estimated $\frac{1}{2}$ gram per pound of body weight.

The following hypothetical case illustrates the above in trying to produce a *ketosis*. In this particular case, weight is the only consideration for the calculation of caloric requirement.

- 1 Weight of man 150 lbs
- 2 Caloric requirement is 16 calories per lb
- 3 150×16 is the caloric requirement.

- 1 Protein requirement is $\frac{1}{2}$ Gm per lb
- 2 Therefore, 75 Gm of protein is the required protein for this man.
- 3 75×4 or 300 calories—the caloric value of protein.

- 1 Carbohydrate requirement is $\frac{1}{2}$ Gm per lb
- 2 Therefore, 75 Gm of carbohydrate is the required carbohydrate
- 3 75×4 or 300 calories—the caloric value of carbohydrate

- 1 Fat is equal to 2 carbohydrate plus $\frac{1}{2}$ protein.
- 2 Fat equals 2×75 plus $37.5 = 187.5$ Gm.
- 3 188×9 or 1692—caloric value of fat.

- 1 Therefore

Protein	=	75	
Carbohydrate	=	75	This is 2 1 ratio
Fat	=	188	

In order to create a *ketosis*, 5 grams should be taken from the carbohydrate daily and its caloric value added to fat until *ketosis* is produced which is evident by acetone bodies in urine.

The protein requirement cannot be changed.

The caloric requirement cannot be changed.

The ratio of fat and carbohydrate, however, can be changed.

As a preventive of nausea and to gradually establish a fat tolerance, a K:AK ratio of 2 1 is preferably used,

which may be gradually increased until a *ketosis* is developed. The return to the normal dietary should be gradual. An increase in carbohydrate of 5 to 10 grams per month, with a corresponding decrease in fat grams, will accomplish this. This diet is diametrically opposed to the normal habits of eating, the basic foods being bacon, mayonnaise, cream, butter, olive oil, fat meats, eggs, accompanied with a minimum amount of carbohydrate, chiefly in the form of 5 per cent fruits and vegetables. Such being the case, there is the question of palatability, which may be improved by the use of (1) 40 per cent cream—to be used in coffee or as a beverage, in cream soups, custards, cream sauces, frozen cream desserts, or as whipped cream on desserts or salads, (2) butter—to be used in cream or butter sauces on vegetables and meats, in peanut butter or combination with cheese, cream cheese, mayonnaise or salad oils, egg yolk, fat meats or fish, D-Zerta (gelatine) and washed-bran wafers are excellent carriers of butter and cream.

The nutritional adequacy is to be considered particularly if the diet is in use over a period of time. Barborka's observations in reference to the régime, were:

- 1 Due to the high vitamine A content—a resistance to infection.

- 2 Due to the lack of vitamine G—a development of pellagra, which was overcome by inclusion of brewer's yeast.

- 3 Due to lack of vitamine B—amenorrhea.

In young girls a cessation of the menstrual periods was noticed, in which case an addition of $\frac{1}{2}$ to 1 teaspoon of brewer's yeast was made.

The mineral content of the diet may vary, but it barely meets the minimum requirement by Sherman and in some

cases a daily dose of 0.3 Gm (5 grains) of calcium is recommended

SALT-FREE DIET.—In discussing "salt-free diet" in the treatment of surgical tuberculosis, M. W. Mettenleiter (*Am J Surg* 18 (Nov) 1932) reviews the dietary work of Gerson, Sauerbruch and Hermansdorfer. The outstanding feature of their diets is the rigid restriction of salt. They demonstrate on many patients that the lack of salt is not harmful and hold that the regulation of osmotic conditions, the main work of sodium chloride in the body, is assured by the amount of salt contained in the food (2 to 4 Gm daily). Artificial increase burdens the system by overelimination and storage.

The fact that tuberculous patients are poor on sodium chloride is taken by Hermansdorfer to indicate self-defense of the organism and he strives to aid the defensive mechanism by further restriction. Fluids, and at the same time, discharges from fistulæ, granulations, etc., are diminished by this restriction. In other words, dehydration is accomplished.

The skin is rich in mineral salts. In the active phase of lupus there is a decrease in the mineral content of the skin and this deficiency approaches normal as chronicity develops. This is taken to indicate that as the body increases its resistance these valuable substances are retained. Their source is from a balanced diet or from the addition of proportioned minerals, such as Gerson's titro salt. This proportion prevents the replacement of other required mineral ingredients by sodium chloride, for which the tissues have a special affinity.

It has been found in the case of lupus that this diet has been most effective. The value of it in pulmonary

tuberculosis is questioned. Good results have been obtained in surgical tuberculosis; fistulæ discharge less and finally close, swelling of tuberculous joints decreases, and the severe joint cases with old fistulæ are reported cured. Beneficial results have been obtained also in older patients whose prognosis is usually poor. Sauerbruch reports 67 per cent of the operated cases resumed work.

In the dietary procedure, Hermansdorfer allows 3100 calories, Gerson 2560 calories. The variation in the caloric value is due chiefly to the protein content, Gerson allowing only 60 to 70 Gm per week, whereas Hermansdorfer allows 500 Gm per week. The former is inadequate to meet the basal protein requirement. Both allow carbohydrate in restricted amounts and fats in abundance. Both diets are rich in vitamins and minerals. Cod-liver oil, combined with phosphorus, is included.

The palatability of the diet is aided by the year-round selection of fresh fruits and vegetables. Cooperation of the patient and his close observation by a well-trained dietitian is essential.

The following table, presented by J. J. Eller and C. R. Rein (*New York State J Med* 32 1296 (Nov 15) 1932), indicates the difference between the Gerson and the Sauerbruch-Hermansdorfer diets (see Table III).

Gerson employs his diet not only in tuberculosis, but in other diseases including various dermatoses.

FOOD ALLERGY.—J. F. Forman (*J Am Dietet A* (Nov) 1932) discusses atrophy or allergy of an inherited type which is transmitted as a dominant Mendelian character. The chart (page 340), he states, given an outline of what is known of atrophy (see Table V).

TABLE III

	Gerson Diet	Hermansdorfer-Sauerbruch Diet
Meat Viscera	At most, 100 grams once a week Prohibited	500 grams weekly Spleen, liver, sweetbread, brain, kidney are recommended
Fish	Only about 70 grams permitted per week	Permitted
Milk Protein	$\frac{1}{2}$ pint per day Daily average protein about 40 grams	$2\frac{1}{2}$ pints per day Daily average protein about 90 grams
Fat	Moderate amounts	160 to 200 grams per day
Cream	Prohibited	About $\frac{1}{2}$ pint per day
Carbohydrate	Generous amounts	200 to 240 grams per day
Potatoes	Generous amounts	At most, 125 grams per day
Eggs	Only yolk of egg	Whole egg
Raw food	Predominant constituent; 3 to $4\frac{1}{2}$ pints raw vegetables and raw fruit juices per day	100 grams raw vegetables and $\frac{3}{4}$ lb raw fruit per day

Elimination diets prescribed by the systematic method of elimination, substitution and identification, have been of major importance in the clinical management of atopy due to food, not only in finding the quality, but also the quantity of the troublesome allergens. Foods

such as wheat, eggs and milk are identified as the outstanding offenders, and in the arrangement of the diets, preference should be given to the foods likely to cause the least trouble. Table IV illustrates 5 trial diets, each of which should be given a test period of 5 to 7 days.

TABLE IV
"ELIMINATION DIETS" FOR THE TREATMENT OF FOOD ALLERGY (ROWE)

	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5
Cereal	Rice (natural)	Corn	Rice Tapioca	Rice Rye	Milk alone for the test period,
Bread	None	Corn pone *	None	Rye rice †	2 to 3
Meat or fish	Lamb	Bacon Chicken	Beef	Cod, halibut and white fish	quarts a day
Vegetables	Lettuce Spinach Carrots	Squash Peas Artichokes	Tomatoes Celery String beans	Lettuce Carrots Peas Beets	
Fruits, jams and fruit drinks	Lemons Pears Peaches	Pineapple Apricots Prunes	Grapefruit Pears Peaches	Pineapple Apricots Pears	
Miscellaneous	Sugar Olive oil Salt Olives (un- stuffed) Maple syrup Gelatin	Mazola oil Sugar Salt	Sugar Wesson oil Salt Gelatin Maple syrup	Sugar Olive oil Salt Olives (un- stuffed)	

* Corn pone is made with corn meal, salt, water, and Crisco

† Rye rice bread: $\frac{1}{8}$ cup rye flour, $\frac{3}{8}$ cup rice flour, 6 level tsp baking powder (Royal), 4 level tsp sugar, $\frac{1}{4}$ tsp salt, $\frac{3}{8}$ cup water, $\frac{1}{2}$ tsp shortening. This recipe makes 8 small muffins. This recipe double can be made into a loaf. Perhaps more palatable if toasted. Royal baking powder does not contain egg.

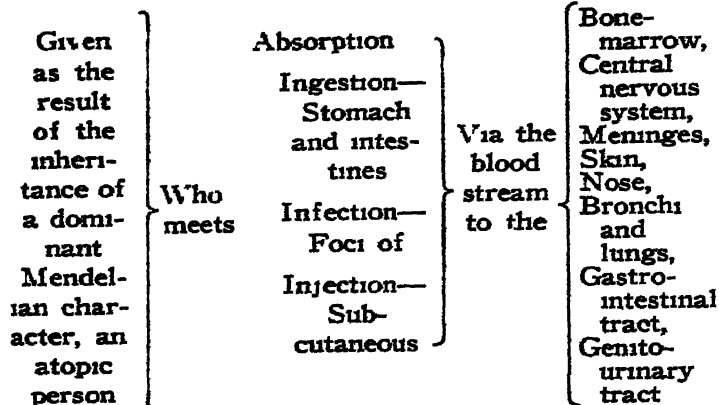
TABLE V

1 ALLERGIC EQUILIBRIUM (W T Vaughan)

There is no clinical manifestation rather a state of tolerance

A SPECIFIC SENSITIZING SUBSTANCE, reaching the cells of the 'shock organ' by

Direct contact
Nose
Skin



With or without the added influence of

A NONSPECIFIC AGGRAVATING FACTOR, such as barometric changes, heat, cold, light, emotions, constipation, exhaustion, malnutrition, focal infections, acute infections, ductless gland disturbances, and mechanical and chemical irritants

FOUR ESSENTIAL CRITERIA FOR DIAGNOSIS OF ATOPHY.

- 1 A family history positive for atophy
- 2 A personal history positive for atophy.
- 3 Positive skin tests
- 4 The presence of an eosinophilia, local or in the blood

2 ALLERGIC REACTION

GENERAL

EYES
Retina, Eczema of lids, Edema of lids, Conjunctivitis, Conjunctivitis vernal
NOSE AND ACCESSORY SINUSES
Recurring head colds, Vasomotor rhinitis, Hay-fever
BRONCHI AND LUNGS
Allergic cough, Asthmatic bronchitis, Asthma, Edema suggesting TBC on films
SKIN
Eczema, Urticaria, Angioneurotic edema, Henoch's purpura, Erythema nodosum, Itching, pruritus ani and vulvae, etc
GASTROINTESTINAL TRACT
Persistent canker sores, Acute gastroenteritis, Acute pain like cholecystitis, Peptic ulcer, Mucous colitis, Essential hemorrhages, Fever due to food allergy in children
GENITOURINARY TRACT
Nephritis, Renal colic, Essential hematuria, Cystitis, Irritable bladder, Enuresis, Essential dysmenorrhea
JOINTS
Arthritis, Intermittent hydrarthroses
CENTRAL NERVOUS SYSTEM
Migraine, Epileptiform seizures, Asthenia, Psychic disturbances (especially children), Neuralgia, Transient paralysis and nerve dysfunction.
CARDIOVASCULAR SYSTEM
Hypertension, Hypotension (the rule), Cardiac irregularities
ALLERGIC SHOCK
Subnormal temperatures, Slow pulse, Lowered blood-pressure, Prolonged coagulation time, Increased N-P nitrogen, Decreased blood chlorides, Ca and P, Decreased sugar tolerance, Leukopenia

Under this trial and error régime, the disturbing food may be identified, removed and substituted with another. Or, in some cases, of unavoidable common foods, desensitization may be accomplished by interval injections of subtoxic doses of the offending protein. The dosage is gradually increased until tolerance is established, when the food may be given in ordinary amounts.

DIETETICS — *Anemia*.—Anemias resulting from disturbances in nutrition and disorders of the alimentary tract form a tremendous group and, granting that the etiology is correct, should be amenable to treatment. It is the opinion of L. J. Witt (Lancet 1 549 (Mar 12) 1932) that the normal human diet contains the necessary substances for maturation of the megaloblast into the normoblast, *i e*, vitamin B and the active principle of liver. Also that the diet contains others, such as vitamin C, thyroxin, iron and traces of various minerals, necessary for the maturation of the normoblast into erythrocyte. Experiments seem to indicate that even development of megaloblasts from the reticulo-endothelial system is dependent upon food substances, the absence of which leads to aphasia. Alimentary disorders which would hinder absorption of necessary substances naturally would give the same effect as a deficient diet.

Clinically, the nutritional anemias are frequently associated with gastrointestinal disorders, stomatitis, glossitis and degeneration of the nervous system. Some, such as nutritional anemia of infancy, which is entirely due to the deficiency of certain minerals in the milk, and that of scurvy, due to lack of vitamin C, are simple and uncomplicated. Others are complicated and manifest the effects of several deficiencies though one may predominate.

Under this latter group are cited the occurrence of iron deficiency in Addison's anemia or the shortage of the liver principle in simple achlorhydric anemia. Still more complex manifestations of multiple deficiencies are illustrated by such conditions as the anemia of pellagra, tropical macrocytic anemia and sprue.

At the recent meeting of the American Dietetic Association, Frieda S. Robschert-Robbins, in a paper on "Anemia Studies," discussed the response of secondary and nutritional anemia to various foods. A brief résumé of her remarks on these foods shall be made in order of their efficacy.

Liver is given first place in the stimulation of hemoglobin formation, regardless of what previous diet the anemic patient had been on. Institution of liver into the diet, even in small amounts, is effective. The potency of liver from various animals, *i e*, calf, pig, beef, lamb, reindeer, rabbit, was found equal. Chicken liver is of value, but fish liver is negative. Chicken gizzard and kidney are also of value, the latter having about 80 to 90 per cent potency of liver. Meat or muscle was found to have great variations in effectiveness and on the whole, the results from it were disappointing.

Fruits, such as apricots and peaches have proven to be important. Hemoglobin formers, such as prunes, plums, raisins and grapes, are active but less favorable. There has been a tendency to give the leafy vegetables more credit as blood builders than is their just due. Great variations are found. Spinach, lettuce, chard and other greens result only in a small increase. Minimum response is obtained from dairy products. This factor should be given special consideration in the feeding of

children whose diet consists largely of milk. In this case, supplementary foods rich in minerals such as copper and iron are required.

Arthritis.—Ralph Pemberton and E. G. Peirce (*Ann Int Med* 5 1221 (Apr) 1932), in discussing the relation of the intestinal tract and diet to the treatment of arthritis, holds as follows:

Increasing attention from the laboratory and clinical standpoint is influencing various analyses of the problems of arthritis which have been previously neglected. This is true of the classification, orthopedic consideration, low caloric diet, and the etiological importance of the gastrointestinal tract (Nichols and Richardson).

The dietary phase was developed by one of the authors in 1912 and emphasized by Fletcher, in 1930, in conjunction with gastrointestinal x-ray studies. The importance of infection is granted but considered overdone. The background upon which the infection process becomes operative is previously laid by hereditary, constitutional make-up, bodily configuration and possibly other factors.

Food and the topographical and physiological abnormalities of the gastrointestinal tract are incriminated in the production of arthritis. Fletcher holds the view that enlargement and tortuosity of the bowel are due to an unbalanced ration and avitaminosis, particularly vitamin B. Similar deformities have been produced experimentally in animals by diets high in carbohydrate and low in protein and vitamins. It is of interest to note that these animals are also prone to infection. A reduction in the caloric value of the diet has been followed by definite improvement of the arthritic symptoms and by restoration of the bowel toward normal.

A series of 12 cases of arthritis and intestinal deformities reported, including both hypertrophic and atrophic forms, were treated largely by dietary measures, as shown on following page.

The low caloric diet is a two-edged tool to be used circumspectly and not recommended as a panacea for arthritis. The observations are incomplete and inconclusive, but the beneficial results obtained in the series justifies a trial of this treatment in any case of chronic arthritis of either the atrophic or hypertrophic form.

Celiac Disease.—Management of cases of celiac disease is not difficult if the fact is taken into consideration that carbohydrates, except in certain forms, are absolutely not tolerated. Also, that fats are taken poorly and are apt to aggravate the symptoms, unless, as with carbohydrates, the proper selection in the form of fat used is made. Protein necessarily dominates.

In the treatment of this condition, Sydney V. Haas (*J A M A* 99 448 (Aug 6) 1932) has obtained good results without nutritional relapses. He rigidly bars carbohydrates, explicitly mentioning "sugar, starches, flour, grains or potatoes, in any of the forms in which they are usually used, such as bread, crackers, zwieback, cereals, puddings, pastries, sweets or dishes that contain them." Milk and fats, particularly cod-liver oil, must be eliminated at the beginning of treatment. All protein and some forms of carbohydrates and fats can be utilized in amounts necessary for maintenance and rapid growth.

Protein milk* is the chief article of

* Protein milk was prepared in the following way. One quart each of commercial buttermilk and water is poured into a pot. This mixture is heated to 145° F. and then pushed to the back of the stove or kept over a low flame to maintain this temperature for an hour (an ordinary thermometer is required). One quart and 4 ounces (1080 cc) of the fluid, which is whey,

First day—juice of 1 orange 3 times a day

Second day—as above plus 1 cup of clear coffee and 1 teaspoonful sugar

Third day—as above plus 8 oz of strained vegetable soup

Fourth day—as above

Fifth day—as above plus 3 Uneda biscuits

Sixth day—semiliquid diet

Seventh day—100 calories

Eighth to thirty-eighth day—1200 calories

After that—1465 calories

	Calories, Protein	Calories, Fat	Calories Carbohydrates	Calories, Total
1 1 egg, boiled	27.1	55.8		85.0
1 glass milk (hot)	29.8	81.8	41.6	157.0
30 grams bread	11.3	3.6	65.3	80.0
15 grams butter	0.6	118.6		119.0
250 grams orange	6.2	2.3	87.1	96.0
Total .	75.0	262.1	194.0	535.0
2 Lettuce, <i>q s</i>				
8 oz vegetable soup (strained)				
60 grams string beans	2.0	6.1	4.7	13.0
Mayonnaise, 1 tbsp	7.6	161.5	1.3	170.0
150 grams apple	1.8	4.2	66.4	72.0
1 glass milk	29.8	81.8	41.6	157.0
Total .	41.2	253.6	114.0	412.0
3 100 grams chicken	131.6	40.9	8.6	181.0
50 grams spinach	4.3	19.0	6.7	28.0
50 grams beets	3.3	0.5	10.7	14.0
30 grams bread	11.3	3.6	65.3	80.0
15 grams butter	0.6	118.6		119.0
250 grams orange	6.2	2.3	87.1	96.0
Total	157.3	184.9	178.4	518.0
Summary	75.0	262.0	194.0	535.0
	41.0	254.0	114.0	412.0
	157.0	185.0	178.0	518.0
Total	273.0	701.0	486.0	1465.0

This diet may be increased gradually to 1800 calories, if necessary

diet at the beginning To this, 4 ounces of 20 per cent cream and 3 ounces banana powder are added per quart. Ripe bananas are given *ad libitum*. After the anorexia has subsided, the abnormal appetite is removed by frequent

is removed and discarded The remaining 28 ounces (840 cc) of whey and curds is then mashed through a fine sieve To these 28 ounces of curd is added 4 ounces (120 cc) of 20 per cent cream (or 4 ounces from the top of a bottle of milk), producing 32 ounces (960 cc) of protein milk

feeding and additions, as meat juice or meat for older children, cottage cheese, egg white, orange juice, fruits and vegetables (with the exception of potatoes), are made carefully, one at a time. As the appetite returns to normal, the usual 3 to 4 hour feedings are resumed. Vitamine D is given early in concentrated form as viosterol. Iron is supplied if secondary anemia exists The diet in 4 to 8 weeks is as follows:

Protein milk	32 to 64 ounces
Banana powder	3 to 6 ounces
Bananas	1 to 6 or more
Cottage cheese	<i>ad lib</i>
Beef juice	
Meat	
Fruit juices or fruits	
Vegetables	
Vioosterol	
Iron	

This is the maximum diet furnishing 80 to 100 calories per pound. If relapse occurs on this régime, in the absence of infection, it is certain that some non-prescribed carbohydrate is being used; surprisingly small quantities will produce disastrous results

The diet period is preferably a year, but in favorable cases forbidden foods as bread and cereals may be introduced, one at a time, 3 months apart, in small quantities, 3 times a day. If no relapse occurs on these additions, others, as milk, etc., may be tried at like intervals until normal full diet is tolerated. If an added food is not well tolerated, as evidenced by minor symptoms at first, and is not immediately removed, a rapid return to the celiac state is the rule.

Diabetes Mellitus.—In the treatment of diabetes mellitus, which is largely dietetic, recent literature indicates that the status of carbohydrate and fat is still a matter of controversy, but at present there seems to be a decided shift in the direction of the *high carbohydrate-low fat, low caloric procedure*. This method reopens the question of undernutrition with its specific advantages, some relating to reported cases of startling utilization of carbohydrates by diabetic patients.

J H Barach in a discussion on lower fat diets in diabetes (J A M A 98 1265 (Apr. 9) 1932), submits a report of 150 cases treated with increased amounts of carbohydrates and lowered

fat intake. The results of the treatment were shown in greater satisfaction to the patient, in many cases an increased carbohydrate tolerance accompanied by a lowered insulin requirement, and, as far as can be judged, a reduction in the complications of the disease.

I M Rabinowitch (Canad M A J 26 141 (Feb) 1932) states that the high carbohydrate—low caloric diet has passed the experimental stage in the treatment of juvenile and adult diabetics and presents an outline of chosen cases, of which the dietary treatment included

- 1 The rigid restriction of fat—approximately 40 to 45 grams

- 2 Liberal carbohydrate—approximately 200 to 300 grams

- 3 The restriction of calories to maintain body weight at approximately 10 per cent below the statistical figure (this may be termed undernutrition), this is particularly stressed to show that on this new diet the patients are not overfed. This diet is instituted by a (ladder) method. The patient is placed on a starvation routine for 2 to 3 days, after which the diet is gradually increased with accompanied doses of insulin, if necessary. From experience, the author feels that this diet is applicable to all forms of diabetes, particularly when associated with biliary disease, where a procedure low in fat and high in carbohydrate is the accepted form of treatment. Also in cases involving cardiovascular disease, this type of diet has a favorable influence in supplying the proper food “glycogen” for the support of the heart muscle.

Since a diet liberal in carbohydrate is important in supporting the liver and heart, it is evident that it is beneficial in the presence of an infection and prior to any surgical operative procedure. When the high carbohydrate—low

caloric diet is used, the carbohydrate tolerance is frequently increased. The insulin dosages are rarely ever increased, and, in many cases, decreased or discontinued. Rabinowitch states that "it is yet an unknown reason why exposure to this diet should lead to an increase in the available supply of insulin." Strong emphasis is laid on the fact that no form of treatment can be successful unless followed as prescribed. This applies more to the new diet than to those previously in use. In this particular method, the temptation is to overstep the fat allowance. If this is done, it is felt the patient is receiving no treatment whatever, and under these conditions, there is a loss of carbohydrate tolerance to the point where insulin is required or the dosage increased. Thus, unless the patient can be relied upon, it is preferable to adhere to other methods from which deviations are less harmful.

Another view is given by Solomon Strouse and Samuel Soskin (J. A. M. A. 99:252 (July 16) 1932) who have made detailed observations in a metabolic unit and find that the diabetic patient can be "adequately controlled under many systems." Groups of diabetic patients were tried on diets high in carbohydrates, protein, and fat, respectively. The results of the study indicated "that the diabetic manifestations of patients on their respective diets were controlled and there were no indications that these diets could not have been carried on indefinitely." Also, they said "that in the extreme range of diets, a comparison of the carbohydrate tolerance and insulin coefficient during these periods, showed the remarkable flexibility in management allowed by only a small difference in insulin." These authorities express the opinion that as the diabetic patients do well on widely varying régimes, there

seems to be little reason for imposing on them a markedly abnormal dietary mixture. Thus, the question of high carbohydrate or high fat should be second to that of providing a well-balanced and comparatively normal menu. This is the opinion which is generally accepted and practiced by the majority, and meets with the cooperation of E. P. Joslin, who feels that "more carbohydrates should be given than was customary, but that it is unnecessary to invite extremes." He takes as his average, approximately 150 grams and follows a conservative course in diet for the adult and child.

E. P. Joslin ("Diabetes in Childhood and Adolescence," 1932), recommends that the caloric requirement of the diabetic child, although slightly less, should compare favorably with that of the normal child, the basal requirement being as follows:

From the age of	
5 to 8 years	1110 calories
9 to 12 years	1200 calories
13 to 16 years	1400 calories

Normal growth is found to occur when the prescribed diets allow 30 to 40 per cent caloric increase above the actual basal requirement with a margin of 1 to 10 per cent for activity or inactivity respectively, according to the child. Over-nutrition is discouraged, as it invites severity of the disease, larger amounts of insulin and a tendency to develop abnormalities of fat metabolism. Joslin feels that successive increases may depend on rate of growth, appetite and well-being, and a safe rule is 5 to 10 per cent caloric increase every 6 months. Concerning the question of carbohydrate intake in the child, he is in doubt whether the optimal quantity of carbohydrate to cause stimulation of the islands of Langerhans lies between

100 and 200 grams or from 200 to 300 grams, or whether both allowances produce the same results. This being the position he prefers a conservative increase, feeling that less than 50 grams is unwise and advising at least 100 or more grams of carbohydrate. He partitions the diet in order that 25 to 50 per cent of the total calories are in carbohydrate, 10 to 20 per cent. of the total calories are in protein, and 35 to 60 per cent of the total calories are in fat.

The following table by Joslin (*Ibid*) illustrates diets for children of 5, 10 and 14 years.

practiced, although it may be considered the most accurate means of computing the nutritive value of the food which is eaten. Scales are of particular value in a metabolic unit where the services of a trained worker are available, but for home use, there is a question as to whether there is sufficient accuracy actually obtained to warrant the hardships, time and energy required of the patient, also whether a simpler method such as interpreting the dietary prescription in the terms of household measurements might not be employed with favorable results.

TABLE VI

Age	Wgt., Kg	Cal., Kg	Total Cal	Range			Our Choice		
				C	P	F	C	P	F
5	16	75	1200	75-150	30-63	46-86	100	48	64
10	28	60	1680	105-210	42-84	65-121	135	70	90
14	45	40	1800	112-225	45-90	70-130	165	85	90

The term "higher carbohydrate" is indefinite. It may range from 100 to 300 grams. A conservative allowance in the carbohydrate intake with a corresponding fat reduction is a favored method in the treatment of diabetes, as it provides a diet which can be nutritionally and palatably balanced. The patient is satisfied and more easily controlled. The tendency to develop coma or infections is lessened and an intentional or unintentional departure from this treatment by the adult or child (who is considered an unstable patient) is not as frequent and the results less serious than those from a more radical method.

In *interpreting the diabetic prescription to the patient*, the question concerning the continual use of scales for determining the food measurements arises. The method of weighing food is one which is generally preached more than

Helmuth Ulrich (*Int med* 5 1487 (June) 1932) is of the opinion that the weighing of food is not a guarantee of the actual carbohydrate, protein and fat intake, owing to the number of variables which enter into the case, such as the process of digestion and absorption which varies with the nervous and mental state of the individual, the amount of cellulose in the diet, which has a bearing on the utilization of protein, the slow absorption of carbohydrate foods in the form of starch, which seems to have less influence on the level of the blood sugar than the rapid absorption of the same amount of carbohydrate in the form of dextrose, the variable compositions of foods, for example, cooked beef, as shown in Table VII.

The carbohydrate in orange juice may vary from 5.04 to 14.3 per cent, in car-

TABLE VII

	Protein, Per Cent	Fat Per Cent	Fuel Value Per Pound
Roast beef	14.5 to 29.7	19.6 to 41.4	1210 to 2030 cal
Round steak	20.3 to 34.1	3.3 to 16.9	615 to 1170 cal
Loin steak	20.6 to 26.6	11.8 to 35.7	925 to 1875 cal

TABLE VIII

A DAY'S RATION BY WHICH APPROXIMATE ACCURACY IS REACHED
WITHOUT THE USE OF SCALES

	Carb	Protein,	Fat.	Cal
<i>Breakfast</i>				
Fruit (one of the following)				
½ small grapefruit, 1 medium peach, 1 small or ½ medium orange, ½ cup berries, ½ small or ¼ large cantaloupe	10	1	0	44
Egg one	0	6	6	78
Bacon 4 half or 2 whole slices	0	5	14	146
Cereal or bread (one of following)				
Oatmeal, cooked thin, ½ cup, ½ cup cornflakes, puffed rice or wheat; ½ shredded wheat, 1 small slice of bread 4 x 3 x ¾ inches, 2 soda crackers	10	2	0	48
Cream 2 tbsp heavy or ¼ cup light	2	2	12	124
Butter 1 tbsp	0	0	12	108
Coffee or tea, unsweetened or with saccharine				
Total	22	16	44	548
<i>Dinner</i>				
Broth clear, fat removed	0	3	1	21
Meat lean, or fish, cooked, 1 slice, 4 x 3 x ½ inches	0	16	10	154
Vegetables 5 per cent, no limit	4	2	0	24
10 per cent, ½ cup cooked	5	1	0	24
Butter 1 tbsp	0	0	12	108
Cream 1 tbsp heavy or 2 tbsp light	1	1	6	62
Tea or coffee as for breakfast, if desired	0	0	0	0
Dessert fruit as for breakfast	10	1	0	44
Total	20	24	29	437
<i>Supper or Luncheon</i>				
Broth as for dinner	0	3	1	21
Vegetables 5 per cent, no limit, 10 per cent, ¼ cup	7	2	0	36
Egg one	0	6	6	78
Olive oil 1 tbsp with vinegar	0	0	15	135
Bread 1 small slice or 2 crackers, as for breakfast	10	2	0	48
Butter 1 tbsp	0	0	12	108
Milk 1 glass (8 ounces)	12	8	10	170
Total	29	21	44	596
Total for 24 hours	71	61	117	1581

rots from 59 to 115 per cent. Foods, as a rule, are analyzed in the raw state and it is a known fact that cooking has an influence on the composition, removing carbohydrate from vegetables, fats from meat, etc. And, lastly, either the intentional or unintentional broken dietary prescription by the patient must be taken into consideration. These features illustrate that accuracy cannot always be obtained by scales.

Very often the dietary prescription which requires weighing is more often broken than one of an easier method, thereby defeating its purpose.

By experience it is found that a simple method of interpreting the prescription in terms of household measures or food units may be used to an advantage. Experiments determining the blood sugar levels were made by the author on groups of people who received diets measured by scales and those by household measurements. The results indicate no significant differences in the daily variation of the blood sugar levels. The table (page 347) is an illustration of how a day's dietary may be calculated in terms of grams of carbohydrate, protein and fat, and interpreted in household units (see Table VIII).

Nephritis.—Until comparatively recently, the dietary in the management of nephritis has almost universally consisted of a low protein content, often below that of the basal requirement. This practice was based on the assumption that the products of protein catabolism which are excreted in increased amounts in some forms of the nephritides (acute hemorrhagic and chronic interstitial nephritis), were injurious to the kidney. The fact that protein catabolism proceeded to practically the same degree as would have occurred in a basal protein intake, was disregarded, and

there was no attempt made to compensate by diet for the abnormal protein loss by way of the urinary tract.

In recent years, the treatment of these conditions, in respect to the protein content of the diet, has taken a complete reversal. The present conception is based on the more sound physiological reasoning that the excessive loss of protein, by way of the kidney, must be replenished to maintain the structure and vitality of cellular tissue as well as the protein content of the blood plasma. Safeguarding these two important systems and supplying adequate caloric intake will most probably eradicate the marked anemia, malaise and actual continuous fatigue encountered under the older methods of management.

The consensus of modern opinion is clearly and concisely expressed by J. S. McLester (J. A. M. A. 99:192 (July 16) 1932) who recommends for *acute hemorrhagic nephritis* 150 grams of protein daily, and in the chronic degenerative form an even larger amount. In *nephrosclerosis*, where entirely different conditions obtain (less protein lost by way of the kidney), 75 to 100 grams of protein daily are advised. The total quantity of food must be adequate for the patient's needs. Energy requirements are made up by the addition of carbohydrates and fats, the former preferably supplying 50 per cent of the total caloric value. This insures the use of protein as a body builder rather than energy producers. When a balanced diet is maintained, a further important consideration is that the type of protein selected be of high biologic value, such as that of meat, eggs and milk. The adult nephritic consuming a quart of milk, 2 eggs and a large serving of meat daily, will have sufficient protein

TABLE IX
LOW-PROTEIN DIET

Food	Amount, Gm	Nitrogen, Per Cent	Nitrogen Gm	Calories
<i>Breakfast</i>				
Bread	20	1 81	0 36	53
Butter	15	0 12	0 02	113
Grapefruit	146	0 13	0 19	67
Banana	99	0 208	0 21	87
Puffed rice	10	1 17	0 12	36
Cream	30	0 397	0 12	57
Total			1 02	413
<i>Lunch</i>				
Bread	16	1 81	0 29	42
Butter	15	0 12	0 02	113
Corn starch	150	0 138	0 21	236
Cabbage	75	0 198	0 15	22
Lima beans	75	0 789	0 59	55
Potato-cake	250	0 323	0 81	277
Total			2 07	695
<i>Supper</i>				
Bread	25	1 81	0 45	66
Butter	15	1 12	0 02	113
Lettuce	25	0 192	0 05	5
Beets	100	0 17	0 17	37
Corn meal	125	0 246	0 31	188
Prunes	86	0 08	0 07	62
Sweet potatoes	100	0 216	0 22	195
Cream	20	0 397	0 08	38
Total			1 37	704
Total for day			4 46	1812

allowance without injurious effects on the kidney

Psoriasis—J. F. Schamberg (J A M A 98 1633 (May 7) 1932) expresses astonishment that the statement made by himself, Kolmer, Ringer and Raiziss nearly 20 years ago regarding the effect of diet on psoriasis has been disregarded by dermatologists. Attention is called to the prevalence of a positive nitrogen metabolism in this disease and the rationale of low protein diet is discussed.

Results of the originally reported work as well as recent observations indicate that by the use of the low protein diet, a large percentage of cases are completely cleared of their eruption

Others are much improved and the skin rendered in receptive condition for applications which under these circumstances are usually curative.

The rationale of this procedure is based upon the belief that by this diet the building materials of the cells (protein) are so restricted that the growth impulse is slowed and thus, the rapid proliferative process of psoriasis is checked. A diet containing 4.5 grams nitrogen and sufficient calories for the patient's needs, supplied largely by fat and carbohydrate, is recommended. Sugar and candy are allowed between meals. Oysters and ice cream, which contain very little nitrogen, may also be added to the diet. To meet the individ-

ual tastes, various fruits and vegetables may be substituted in the diet

An example of such a diet is included in Table IX

DIGITALIS.—Tincture of digitalis was irradiated with mercury vapor quartz lamps, with x-rays and radium by D I Macht (Arch Phys Therapy 13 5 (Jan) 1932) Irradiation with ultraviolet rays for short periods of time produced a deterioration or weakening in the pharmacologic potency of the tincture, as tested on living plants and animals On progressive and prolonged exposure to ultraviolet rays, a point was reached where the photochemical changes resulted in the formation of products exhibiting a greater toxicity for both plants and animals This stage, on still further exposure, was followed by a secondary weakening in the pharmacologic potency of the irradiated tincture The shorter ultraviolet rays, particularly those transmitted through a chlorine-bromine gas filter, were more effective than the longer rays in producing the changes described above Exposure to x-rays, to radium and to radium emanations resulted in a product which was greatly reduced in its activity for the animal heart, on the one hand, but was greatly increased in toxicity for living plant protoplasm on the other.

A E Smith and S R Benner (Am Heart J 7. 182 (Dec) 1931) report a case of *eosinophilia* associated with digitalis administration which occurred under their observation. Similar cases in the literature are cited, although its occurrence would appear to be exceedingly rare The maximum of eosinophilia attained was 30 per cent. and this was maintained for a period of 2 weeks. A search for parasitic infection revealed no

evidence of such and a complement-fixation test for echinococcus was negative No dermatitis or other obvious dermatological condition was present Of interest is the fact that the patient had been under observation for a year and four months before eosinophilia was noted Although digitalis had been given on more than one occasion when the high eosinophile count was first discovered, he had been receiving outside of the hospital what appeared to be a mildly intoxicating dose The history made it apparent that no particular preparation of digitalis could be blamed for the eosinophile response which at one time followed a tincture and at another seemed to be induced by a large dose of the powdered leaf

The authors state that there is some evidence from the literature that the vagus or autonomic system has an influence on the number of eosinophilic cells in the blood, it having been demonstrated by several investigators that direct stimulation of the vagus produces an increase of eosinophiles in the blood of experimental animals and that the administration of pilocarpine resulted in such an increase, while atropine caused a reduction in the percentage of eosinophiles Smith and Benner, however, subjected their patient to a series of experiments with atropine, adrenalin and pilocarpine, but pilocarpine had no effect on the eosinophile count Adrenalin produced a sharp drop, with a gradual rise to the original level Atropine, in a dose of $\frac{1}{200}$ grain (0.3 mg), caused a rapid, though slight, drop with almost immediate return The effect of $\frac{1}{100}$ grain (0.6 mg) of atropine was more striking and much more persistent In 7 hours the eosinophilia had not returned to its original level

UNTOWARD EFFECTS.—As a result of clinical observation and experimental pharmacologic studies with the intact animal, in which the blood flow from the coronary sinus was measured after the administration of digitalis and compared with a control group, G K Fenn and N C. Gilbert (J A M A 98 99 (Jan 9) 1932) report several cases with *anginal pain* produced as a result of digitalis administration. That coronary constriction does not occur in every case, does not appear to the authors to be surprising. The action of digitalis is dependent on a great number of variables and the regulation of the coronary flow is under a very complicated mechanism, and every automatic adjustment must be brought to bear to prevent the occurrence of a condition that is of such great physiologic disadvantage to the organism. That it does occur in some cases seems, to these investigators, to be beyond question, but they have discovered no way to forecast its occurrence in any given case.

In a comprehensive study of the etiology of *auricular fibrillation*, D McEachern and B M Baker, Jr (Am J M Sc 183 35 (Jan) 1932) point out the production of auricular fibrillation as a result of too enthusiastic administration of digitalis and its products. In a group of 14 syphilitic patients presenting the clinical picture of syphilitic aortitis with aortic insufficiency, fibrillation of the auricles appears to have been induced by digitalis in 9 instances. In 5 of these cases the strict criteria, suggested by W R Resnik as a basis for judgment upon the relationship between auricular fibrillation and digitalis therapy, were satisfied in every instance, *viz*, (1) absence of history of previous attacks of auricular fibrillation, (2) normal rhythm before administration of

digitalis; (3) appearance of auricular fibrillation after a dose of digitalis shown, by clinical and electrocardiographic evidence, to be an effective amount, (4) persistence of the abnormal rhythm as long as digitalis is continued in doses sufficiently large to compensate for the elimination of the drug; (5) reestablishment of normal rhythm after discontinuance of the digitalis, (6) confirmation of the changes in rhythm by means of electrocardiographic records, (7) exclusion of other factors which tend to bring on transient auricular fibrillation.

In the remaining 4 cases of this group a patent relationship existed between digitalis therapy and the onset of auricular fibrillation, although not all of the criteria listed above could be satisfied. These patients all had severe cardiac decompensation and their electrocardiograms on admission showed normal sinus rhythm. After the administration of digitalis in large doses, clinical signs of the therapeutic effect of the drug were noted, auricular fibrillation ensued and the T-waves of the electrocardiograms revealed changes that were attributed to the digitalis therapy. After the drug was discontinued, however, the cardiac rhythm in these 4 patients failed to return to normal during the period of their observation (24, 17, 4 and 2 days, respectively, after the onset of auricular fibrillation).

In most instances the authors noted that large doses of digitalis were required to produce the arrhythmia, although it is possible that the customary doses may do so in susceptible individuals. The onset of fibrillation was preceded in every instance by other evidences of digitalis intoxication, most frequently by the appearance of extra systoles and coupled rhythm or, more

rarely, by the development of nausea, vomiting, diarrhea and other concomitants of digitalis action. No instance was noted in which the development of fibrillation seemed to have had any appreciable influence—either for better or for worse—upon the general clinical condition of the patient.

THERAPEUTICS.—W. Nonnenbruch and K. Gotsch (Med Klin 28 1127 (Aug 12) 1932) state that since *rectal digitalis therapy* was introduced by Eichhorst, it has steadily gained in importance. They show that it has the advantage over oral administration of a more rapid action and that nausea is much rarer in rectal than in oral application, they having observed it in only 1 case of rectal therapy. Local irritation in the rectum from prolonged administration of digitalis suppositories is likewise comparatively rare. Because of these advantages, the authors have resorted to rectal administration more and more, especially in cases in which stasis also existed in the greater circulation, particularly in the portal system, such as in decompensated mitral defects and in lesions of the myocardium. They consider the rectal administration never of less, and usually of greater, value than oral therapy, especially when rapid action is essential and when gastric disturbances are to be avoided. To illustrate their statements and to encourage wider use of rectal digitalis therapy, they give a number of clinical histories, and are convinced that rectal digitalis therapy can replace to a large extent also subcutaneous and intravenous administration.

W. Zur-Linden (U S Nav. M. Bull 30: 355 (July) 1932) believes that the United States Pharmacopœia does not go far enough when it makes mandatory the biologic assay of digitalis. It should

also insist that the manufacturer shall state on his containers the date of manufacture and biologic assay, so that tincture of digitalis used at the bedside will be dependable and will produce definite heart stimulation. The author's past experience would lead him to recommend only the use of the whole leaf tablets that have been stored in amber glass tubes bearing the date of manufacture and biologic assay as determined by the United States Pharmacopœia frog method or Hatcher's cat method.

DIPHTHERIA. — INCIDENCE AND MORTALITY.—In the United States the mortality rate of diphtheria has steadily declined during the last 5 years. According to the last annual report on this subject (J A M A 98 1644 (May 7) 1932), the mortality rate of 88 of the largest cities of this country in 1931 was the lowest ever recorded (3.74 per 100,000 population) and less than half of that of 2 previous years. For the first time, none of these cities reported a rate higher than 20 per 100,000, and all but 3 had rates of less than 10. The cities in the mountain and Pacific states continued to have the smallest number of deaths from this disease, while in 2 sections of the country the rates increased slightly during the year. Rather severe epidemics occurred in Washington, Atlanta, Norfolk, Chattanooga, Memphis, Knoxville and Nashville. The influence which widespread immunization against diphtheria has had in reducing the incidence and severity of the disease is questionable and the conclusions drawn from the last paragraph of the above report are as follows: "It cannot yet be said how far this decline in diphtheria mortality is due to the natural fluctuation in the severity of the disease and how far to

the institution of protective inoculation and other control measures. The available facts, however, are such as to warrant the continuance even more intensively of the control measures now being advocated in this country."

From a statistical analysis of the epidemics of diphtheria occurring in communities where immunization against the disease has been practiced, E. S. Godfrey, Jr. (Am J Pub Health 22:237 (Mar) 1932) was led to believe that the immunization of 30 per cent of the children under 5 years of age, together with the immunization of 50 per cent of the children of school age, would have a marked effect in reducing the incidence of clinical diphtheria in that area. He added, however, that a campaign of immunization of 30 per cent of the children of pre-school age would be more effective if applied intensively in certain localities of a community in which diphtheria is most prevalent. It was the author's opinion that the mild undiagnosed case of diphtheria is much more dangerous than the carrier in spreading the disease.

Immunization against diphtheria will considerably reduce the incidence and mortality rates of that disease if practiced on 50 per cent of the children under 10 years of age, according to S. F. Dudley (Quart J Med 1:213 (Apr) 1932). He added that the immunization of 80 to 90 per cent of this age group would probably eliminate diphtheria from a community.

PATHOLOGY.—The exact composition of diphtheria toxin has never been ascertained, but it has been supposed to be closely related to a protein substance. This was confirmed by M. E. Maver (J Infect Dis 49:1 (July) 1931), who noted that when a solution of toxin was placed in an electric field,

the toxin and a protein migrated to the cathode when the pH was 3.75 and to the anode when the pH was 4.05. This protein and the toxin were destroyed at the same time by the action of trypsin and pepsin. There was evidence that the toxin was a whole protein, since the toxin was destroyed readily by alkaline trypsin, while neutral trypsin had a much more retarded action.

Numerous studies have been made recently on the pathologic lesions produced by diphtheria toxin on the body tissues. *Degenerative changes in the aortas* of rabbits were observed by G. L. Duff (Arch Path 13:543 (Apr.) 1932) as the result of repeated injections of small amounts of toxin in a large series of rabbits. The lesions appeared first in the media of the blood-vessels as areas of cloudy swelling, followed later by degeneration and necrosis. In the final stages there was fatty degeneration and an occasional calcium deposit. In some of the animals, portions of aortic wall became so thin that aneurisms developed.

Diphtheria toxin causes some disturbance of the *sugar metabolism* of the patient, but the mechanism of this action is not clear. The fact that patients with severe diphtheritic infections have a decreased sugar tolerance has been confirmed by A. Brems (Klin Wchnschr 11:895 (May 21) 1932). The results obtained from the dextrose tolerance tests of his cases resembled those of diabetic patients and the decreased tolerance continued for 2 or 3 weeks after the onset of the infection. In severely ill patients, the sugar appeared in the urine. The author attributed the disturbance of dextrose metabolism to some pathologic lesion produced by the diphtheria toxin on the liver, the adrenals, or the pancreas.

It has also been noted that the *cholesterol* content of the blood was elevated above normal levels in diphtheritic infections. R. Simonetti (Riv di clin pediat 29 1048 (Nov) 1931) observed such a rise in 20 children who were convalescing from the disease and also in 22 children who had just received injections of diphtheria toxoid.

There is an increase in the *nonprotein nitrogen* content of the blood of diphtheria patients, and the degree of elevation has some prognostic value, according to J. Prochazka (Casop lek cesk. 68. 1269 (Sept 13) 1929). In a series of 59 patients with severe infections of diphtheria, all of those who had less than 40 mg per cent of nonprotein nitrogen in the blood, recovered except 1, while all but 1 of those who had more than 50 mg per cent, died.

The *inorganic phosphorus* content of the blood is also increased during diphtheritic intoxications. E. Lesné, P. Zizine and S. B. Briskas (Compt rend Soc de biol 109 430 (Feb 19) 1932) found this to be true in patients with severe or moderately severe diphtheria, but they observed that the phosphorus returned to normal levels as the patient recovered. The phospholipides, however, have been found to be reduced in amount during severe infections of this nature, according to C. Cocchi (Riv di clin pediat 29 581, 1931). The amount of phospholipides was especially low in patients with paralysis and tended to increase when the patient began to recover.

In a comprehensive study of the effect of diphtheria toxin on the blood constituents of rabbits, A. Ashley (Unpublished thesis, presented for a Doctorate of Philosophy, Univ Cincinnati, 1932) observed a marked rise of both the *inorganic phosphorus* and the *organac*

acid-soluble phosphorus. The latter compounds occurred almost exclusively within the blood cells. The increase of the amount of these phosphorus compounds and the increase in the nonprotein nitrogen content of the blood, together with the diminution of urine output and a loss of weight by the animal, were symptoms which could be explained in part by a rapid destruction of body tissues and an impairment of the excretory functions. The erythrocyte count and the relative cell volume of these animals increased during the early stages of the diphtheria intoxication, decreased as the toxemia became more severe. In regard to the effect of the toxin on the metabolism of glucose, it was noticed that the tolerance of the rabbits did not decrease when the glucose was given intravenously, but the intravenous glucose did cause an abnormal fall in the inorganic phosphorus content of the blood. Insulin, which was administered to these intoxicated animals, produced the customary hypoglycemic action, indicating that diphtheria toxin had no depressant effect on the action of that drug.

BACTERIOLOGY.—The variation in the severity of epidemics of diphtheria, and the occurrence of types of diphtheric infections which do not seem to yield to the treatment with ordinary antitoxin, have led to further investigations of different strains of the causative microorganism. J. S. Anderson, F. C. Happold, J. W. McLeod and J. G. Thomson (J Path and Bact 34 667 (Sept) 1931) have differentiated 2 types of diphtheria bacillus, one associated with severe infections and the other with milder ones. A special culture medium was prepared with blood agar and a slightly heated broth. To this mixture, sterilized by filtration, potas-

sium tellurite was added in a percentage of 0.04. Cultures of the 2 types of microorganisms differed in their gross appearance. In addition, the bacillus which reduced the severe clinical diphtheria was found to ferment polysaccharides, while the other bacillus did not.

Diphtheria bacilli frequently assume various forms on different types of media. Lately, C. G. Pope and S. Pinfield (Brit. J. Exper. Path. 13: 60 (Feb.) 1932) were able to produce changes in the shape of the microorganisms from bacilli to cocci by the use of a medium containing 10 to 20 mg. of copper. The medium was composed of an ox muscle digest broth, sterilized by filtration, and brought to a pH of 8.0. Copper was added in the form of copper sulphate because it was thought necessary that this metal be present in its ionized state. This coccus form was observed to be nontoxin-producing.

The part which a *bacteriophage* for diphtheria plays in combating this disease is not known, but it has been found in many places by G. H. Smith and E. F. Jordan (Yale J. Biol. and Med. 3: 423 (May) 1931). They were able to recover it from sewage, throat washings, the stools and urine of patients with diphtheria, from carriers of the disease, from noncarriers, from the air, and from the floor sweepings of laboratories in which the investigation was being conducted.

CLINICAL ASPECTS.—Diphtheritic lesions of the skin are rather rare and occur more frequently in infants under 2 years of age, according to the review of the previously reported cases made by H. Stux (Nourrisson 19: 228 (July) 1931). He himself has observed 16 infants who had primary lesions of this type and 8 others who had lesions secondary to diphtheria else-

where in the body. Eczema seemed to be a predisposing factor in the development of this type of infection of the skin.

The difficulty in differentiating *diphtheria of the larynx* from other types of laryngitis has led to the frequent use of the laryngoscope for direct observation of the lesion. This procedure is also valuable in the treatment of the disease, according to W. T. Benson (Lancet 2: 956 (Oct. 31) 1931). With the instrument in place, suction could be employed to better effect and, if necessary, a tube could be inserted with a direct view of the procedure. It likewise led to an earlier diagnosis of the type of involvement which is not relieved by a tube, but requires immediate tracheotomy, for example, the lesion characterized by marked edema, or that unusual variety of diphtheria in which the primary infection develops in the lower *tracheobronchial region*. An instance of this latter type was observed by V. K. Hart and C. N. Peeler (Arch. Otolaryng. 13: 714 (May) 1931). The patient had certain symptoms of the usual laryngeal diphtheria, such as a tracheal tug, the retraction of the intercostal spaces and the epigastrium, cyanosis, and evidence of toxemia, but, on the other hand, the voice was clear and the difficulty of breathing was associated with expiration rather than with inspiration, and resembled asthma in these respects. The treatment recommended was a low tracheotomy with repeated aspiration of the lower trachea and bronchi by means of a rubber catheter.

The diagnosis of *cardiac involvement* in patients with diphtheria has been aided somewhat by the electrocardiograph. Often, the mild or early lesions can be detected with this method before

there is clinical evidence of this complication. However, the studies of S Alstead (Quart J Med 1 277 (Apr) 1932) indicate that the severer types of heart failure in diphtheria can usually be detected as readily from the physical findings as from the electrocardiographic tracings. He reviewed the results of electrocardiographic and the clinical examination of 100 patients with diphtheria and cardiac involvement. These patients were divided into mild, moderate and severe groups, according to clinical aspects of the disease.

Instances of myocarditis in which the clinical diagnosis and the electrocardiographic evidence of that lesion coincided, were characterized by the diminution of the intensity of the first heart sound, changes in the nature of the cardiac impulse at the apex (usually an increased intensity of its thrust), a shift of the apex beat to the left, and a splitting of the first sound which produced a "triple" rhythm. The electrocardiogram demonstrated exacerbations of the cardiac lesion whenever postdiphtheritic paralysis in other parts of the body developed. Certain instances of cardiac failure did not show sufficient electrocardiographic or clinical signs of heart involvement to account for the collapse, and the investigator suggested that either the extracardiac circulatory apparatus or an exacerbation of degenerative changes elsewhere, possibly in the medulla, must be considered as the primary etiologic mechanism. Complete *heart-block* was the most common lesion diagnosed by the electrocardiographic tracings in patients with total circulatory collapse.

A comparison of the electrocardiographic diagnoses and the changes noted at autopsy of diphtheritic patients were recorded by W Grunke (Ztschr f klin.

Med 120 40 (Apr 5) 1932). All but 2 of a group of 23 patients with definite abnormalities of their electrocardiograms died and autopsies showed considerable degenerative or proliferative changes in the heart, although it was impossible to localize the lesions. Another group who had normal tracings of their heart action, but died of diphtheria, had very little pathologic evidence of heart involvement.

TREATMENT.—The unusually severe epidemics of diphtheria in Europe during the last few years and the apparent lack of response of the disease to the usual treatment, led to the use of large doses of antitoxin (200,000 to 300,000 units). An objection to this intensive treatment has been expressed in the report of F Reiche and E Reye (Deutsche med Wchnschr 56 1162 (July 11) 1930), who compared the results of one Berlin hospital in which it was the practice to use large doses of antitoxin, with those of another hospital in the same city, where smaller ones were routinely employed. There was very little difference in the clinical results obtained. The authors concluded that the important factor is still the *early administration* of the treatment rather than an increase in the dosage. They recommended amounts of antitoxin, suggested by Langer, of 200 units for each kilogram of body weight in mild infections and 500 to 1000 units in more severe ones.

In a comparison of 1860 fatal diphtheria infections occurring during the years 1900 to 1929, A Lichtenstein (Ztschr f Kinderh 51 755 (Nov 6) 1931) concluded that there was very little difference in the death rate in the years in which larger amounts of antitoxin were employed than in earlier periods of less intensive treatment.

With the knowledge that diphtheria patients have increased amounts of sugar in the blood and have less ability to burn it than previously (see paragraphs on Pathology of Diphtheria), insulin has been employed in treatment of severe infections of this disease. E. C. Benn, E. Hughes and S. Alstead (Lancet 1 281 (Feb 6) 1932) used dextrose and insulin treatment in addition to antitoxin in a group of 89 toxic diphtheria patients. In comparison with a group of 131 patients with equally severe diphtheria but treated with serum alone, the clinical results were favorable. The mortality rate was 35.9 per cent in the control group and 22.5 per cent in the specially treated group. The general course of treatment began with an intramuscular injection of antitoxin and a blood sugar determination. This was followed in an hour by intravenous antitoxin together with 40 c.c. ($1\frac{1}{2}$ ounces) of a 50 per cent glucose solution. The dextrose tolerance of the patient was observed by blood sugar determinations 10 minutes, 1 hour, $1\frac{1}{2}$ hours and 2 hours later. If the dextrose tolerance was diminished, as indicated by an elevation of the blood sugar content above the normal levels in the 2-hour sample, insulin was administered. In addition, the patients were given 125 to 250 Gm ($4\frac{1}{6}$ to $8\frac{1}{8}$ ounces) of dextrose in lemonade, daily. If this could not be swallowed, dextrose was given intravenously.

It was interesting to note that serum sickness following the antitoxin therapy was less frequent in the dextrose-treated group (18.4 per cent) than in the control group (20 per cent).

Serum Treatment.—Complications—The administration of diphtheria antitoxin is always accompanied with some danger because of the possibility that

the patient may be hyper-sensitive to horse serum. In reviewing the records of 2859 patients who had received diphtheria antitoxin, L. W. Hunt (J. A. M. A. 99:909 (Sept 10) 1932) found that 28.1 per cent had had some sort of reaction occurring between the first and the twenty-ninth day after the injection of the serum. Many of these reactions appeared on the sixth to seventh day and the great majority developed within the first 11 days.

The reactions were somewhat more numerous and severe among those who had received the larger quantities of serum. In a comparison of the reactions among patients who had received equal quantities of serum, there seemed to be little difference whether that serum was of the concentrated variety or not. There was no marked variation in number of serum reactions among various age groups.

Nine fatalities from *anaphylaxis* have been observed by G. L. Waldbott (*Ibid.* 98:446 (Feb 6) 1932), 6 resulting from injection of diphtheria antitoxin, 2 of them of tetanus antitoxin and 1 of ragweed extract. In only 2 instances was there a previous history of asthma or hay-fever, but 8 patients had had some kind of serum or protein administered in previous years. The author concluded from these observations that neither a negative family nor personal history of allergy, nor a negative preliminary skin reaction could be relied upon entirely to eliminate the possibility of a severe reaction. The administration of serum intravenously, including the accidental rupture of a vein in giving subcutaneous or intramuscular injections, seemed to lead to severe reactions most frequently. The rapid appearance of a local reaction was often a warning of impending danger and the

immediate application of a tourniquet about the arm, in order to prevent absorption of the serum, and the injection of adrenalin about the local area of reaction, proved to be the most valuable methods of treatment

Desensitization of the patient by the injection of small amounts of serum at short intervals has not always been a safeguard against severe reactions, according to the experience of this author. When adrenalin was mixed with the serum, it was more effective in combating the ill-effects of reactions than when it was injected after the symptoms arose.

Weakness or paralysis of certain muscle groups has been observed as a result of the administration of serum. In the case of diphtheria patients it is often quite difficult to differentiate between a paralysis due to that disease itself or to some other cause, but in the patients included in the following groups, there were certain clinical aspects which lead the observers to believe the serum was the responsible agent.

G. Wilson and S. B. Hadden (*Ibid* 98 123 (Jan 9) 1932) observed 6 patients who had had either tetanus antitoxin or diphtheria antitoxin. They all developed lesions accompanied by *pain, generalized arthritic symptoms, urticaria, weakness or paralysis of a muscle group or disturbances of sensation* in the same area. The brachial plexus group was the one most frequently involved. In the opinion of the author, an edema of the nerve trunks was a likely explanation of this complication.

H. Roger, C. Mattei and J. Paillas (*Ann de méd* 29 610 (May) 1931) observed 9 adults with *paralysis of arms* subsequent to the administration of diphtheria antitoxin. The quantity of serum varied from 20 to 60 cc. The

symptoms began with an edema of the legs, urticaria, arthritic pain and fever. The lesion localized later in the upper part of shoulder, accompanied by lancinating pains down the arms and later by the development of a flaccid paralysis. The symptoms did not seem to be typical complications of diphtheria itself, but possibly were the result of an allergic reaction to the serum which involved either an area of the spinal cord and certain nerve roots or the peripheral nerves of the brachial plexus.

IMMUNIZATION. — Although methods of active immunization against diphtheria have been generally approved by the great majority of investigators in various parts of the world, there is occasionally the expression of an opinion that the value and results from this procedure have been greatly overestimated. From a study of the morbidity and mortality statistics of diphtheria during the years 1920 to 1930, E. Friedberger (*Med Klin* 27 645 (May 1) 1931) concluded that diphtheria has been in a period of decline generally, and that the widespread immunization procedures have had little influence on this decrease of incidence but have only created a false security in the minds of the laity. He also stated that animal experiments which demonstrate the production of active immunity and the rise in antitoxin content of the blood do not necessarily imply that human patients react in a similar manner. His criticisms are answered by J. Siegl (*Ibid* 27 1171 (Aug 7) 1931), who referred to the numerous human experiments which have been performed to test the reliability of active immunization, and he emphasized the point that the Schick test is only the measurement of a certain amount of antitoxin in the blood of patients and does not insure in every

instance that the person will not contract the disease

Of the various materials available for active immunization of patients against diphtheria, the general trend of opinion has been in favor of the toxoid material, which is a formalin-treated diphtheria toxin developed chiefly by Ramon and his associates, in France. During the last few years the advantages of toxoid which have been noted repeatedly are its reliability in producing immunity, the rapidity with which the immunity is developed, and the absence of horse serum which might sensitize a patient to subsequent injections of that nature. In regard to the sensitivity to horse serum produced by other immunizing agents, A. I. Goldschlager (M. J. and Rec 135:265 (Mar 16) 1932) observed 3 patients who developed rather severe serum reactions after therapeutic doses of antiserum. The only history these patients gave of previous serum injections was diphtheria toxin-antitoxin treatment some years previously, which the author believed to be the etiology of the hypersensitivity that had been developed.

In a comparative study of various immunizing materials, C. Artusi and V. Migliori (Riv di clin pediat 29:295, 1931) observed that the toxoid produced negative Schick reactions in 93 per cent. of a group of 167 susceptible children, toxin-antitoxin protected only 63 per cent. of 61 such children, while the ointment of Loewenstein was successful in only 32 per cent. of a series of 57 susceptible children.

One hundred per cent immunization has been obtained with toxoid injections by G. Ramon, R. Debré, M. Mozer and G. Mozer (Compt rend Soc de biol. 107:485 (June 5) 1931) by increasing the strength of their solution by 60 per

cent and using larger doses (10 c.c., 2 c.c. and 2 c.c. at 3 weeks' intervals). By this method a group of 123 infants, 14 and 15 months old, were all made Schick-negative by 4 to 8 weeks after the last injection and a series of 142 children between the ages of 2 and 5 years were made negative in 15 days after the last injection. The serum antitoxin of these children was raised to a sufficient level to make them immune (at least $\frac{1}{30}$ of a unit antitoxin per c.c. of blood).

S. F. Dudley (Quart J Med 1:213 (Apr) 1932) has employed various immunizing agents in the treatment of a large number of institution children and he concluded that toxoid is a much more powerful antigen than toxin-antitoxin. The rather severe reactions which accompany the administration of toxoid to older children and adults have been noted previously by numerous other clinicians, and this has been the outstanding criticism of the toxoid reagent. The writer stated, however, that the use of toxoid in adults is never dangerous.

Several attempts have been made to concentrate the diphtheria toxoid and thus reduce the reactions it produces in older patients. A. Wadsworth, J. J. Quigley and G. R. Sickles (J. Exper. Med 55:815 (May 1) 1932) were able to obtain a precipitate by adding acetone to a toxoid solution which had been cooled to 4° C. This precipitate contained the antigen and was soluble in saline solution. It remained stable for 7 months, could be frozen, filtered, treated with a preservative, or could be heated to 39° C without any loss of its antigenic properties. About 62 per cent. of the nitrogenous material was removed by this method and its flocculation power with known antisera was

reduced only 15 per cent. It was possible to prepare a solution twice as concentrated as the original toxoid which, in tests on guinea-pigs, was found to have properties of immunization which were equal and usually greater than the original material.

Another method of *concentration* was employed by D M Wells, A H Graham and L C Havens (Am J Pub Health 22:648 (June) 1932), who treated toxoid with an *aluminum* and *potassium sulphate solution*, thereby removing 52 per cent. of the protein material and producing a concentrated mixture. With a single injection of this purified toxoid, 94 per cent. of a group of 98 susceptible children were made Schick-negative.

The method of diphtheria immunization advocated by Loewenstein, of Vienna, a few years ago consists of successive applications to the skin of an ointment containing a formalin-treated mixture of dead diphtheria bacilli and toxin. This procedure has the great advantage of being painless and easy to apply, but the reports of the last year confirm previous impressions that the method is not sufficiently effective to be generally adopted. A Rosenbluth (Ztschr. f. Kinderh. 50 775 (Mar) 1931) used the ointment to immunize 120 boys between the ages of 11 and 18 years who were susceptible to the disease, but was only able to make 36 per cent. of them Schick-negative by 22 days after the third injection. In another group of 108 susceptible children, only 32.5 per cent. were made negative.

G Blumenthal and E Nassau (*Ibid* 50 742 (Mar) 1931) obtained better results, in that 2 applications of the ointment made a change in the Schick reaction from positive to negative in 65 per cent. of a group of 157 children, 1

to 9 years of age. It was his opinion, however, that the tests, both on human patients and on animals, indicated that the method was too ineffective to be valuable for general use.

The *passive immunity of newly born infants* has been considered to be the result of the transmission of antitoxin from the mother to the child *in utero*. Within the last year, L V Richardson (J Immunol 22 351 (May) 1932) has studied this subject in guinea-pigs, and found that the immunization of the mother animal produced antitoxin in her blood which was transferred to her offspring in comparable quantities, and that this was accompanied by a transmission of an antibacterial body as well. A similar experiment was carried out in human subjects by C Sorrentino (Pediatrics 39 849 (Aug 15) 1931). Pregnant mothers who received toxoid from the seventh month to the end of gestation developed sufficient antitoxin to transmit a considerable quantity to their infants. In 18 such patients the investigator found a direct parallelism between the antitoxin content of the blood of the mother and her child.

The *duration of this passive immunity* acquired by the *infant* has a bearing on the time at which his active immunization treatment should be initiated. J Blum (J A M A 98 1627 (May 7) 1932) has observed that active immunization is ineffective while the infant still has considerable antitoxin in his body. In a group of 267 infants, immunization with toxin-antitoxin was attempted, but the subsequent Schick tests, performed 3 and 6 months later, showed that only 32.4 per cent. of this number became Schick-negative at the end of 3 months, while 74.3 per cent. of the older infants between the ages of 3 and 9 months, and 94.6 per cent. of children between the

ages of 2 and 4 years developed negative Schick reactions after similar treatment. It was thought to be unnecessary and unwise to attempt active immunization of infants under the age of 9 months.

Although the great majority of mothers and their newly born infants have relatively the same amount of antitoxin in their blood, their Schick tests may not be the same. Some infants may have negative reactions, while their respective mothers have positive ones. This has been the subject of numerous investigations.

Recently, J. V. Cooke and B. M. Sharma (Am J Dis Child 44:40 (July) 1932) tested 643 mothers and their newly-born infants and observed that in 12 per cent of the group the mothers had strongly positive Schick reactions and their babies had negative tests. Assuming that the antitoxin content of blood of both mother and child is about the same, the difference in reactivity of the skin has been explained by the assumption that less antitoxin was needed by the infant than the adult to neutralize the toxin. Another hypothesis is that the toxin which was introduced for the test is not held locally in the skin in infants long enough to produce reactions. The investigators do not believe the latter explanation is valid, because their observations indicated that there is a sensitivity relationship between the mother and her child, because (1) the positive reactions of the infants were found to be less in extent than those of their respective mothers, and (2) the positive reactions of the infants appeared and disappeared more rapidly than those of their mothers. The authors are rather inclined towards the view that infants possess a definite power of destroying or neutralizing toxin and they refer to the work of A.

Wadsworth and E. N. Hoppe (J Exper Med 53:821 (June) 1931) that tissue cultures of rapidly growing embryonic cells possess an unusual ability to destroy or neutralize diphtheria toxin.

The effectiveness of tonsillectomy on the production of active immunity to diphtheria was reported a few years ago by B. Schick and A. Topper (Am J Dis Child 38:929 (Nov) 1929). Subsequent investigations have failed to corroborate their observations. No doubt, the clinical observation that diphtheria is quite rare among those persons who have had their tonsils removed is accurate, but whether this is the result of an increase in the antitoxin content of the blood or is a local protection of some sort, has been open to question. S. F. Dudley (Lancet 2:1398 (Dec 26) 1931) observed that the number of carriers was only about half as great in a group of children who had had their tonsils removed, as compared to the control group, although the number of children who harbored virulent diphtheria bacilli was about the same in each group. There were twice as many Schick-negative boys in the tonsillectomized group as in the control series, while those who had their tonsils out but still retained positive Schick reactions, were more readily immunized than the group of susceptible boys who still had their tonsils.

Little effect from tonsillectomy was noted by A. H. G. Burton and A. R. Balmain (*Ibid* 2:1401 (Dec. 26) 1931) in their study of 682 children who lived in a residential district which was neither rural nor congested in nature. Of this group, 190 had had their tonsils removed and there were still 20.5 per cent. who were Schick-positive. Of the entire group, 527 had positive Schick reactions and of this number 27.3 per

cent had had their tonsils removed and about an equal percentage, 29.6, had not. Similar results were obtained by N. G. Shaw (*Am J Dis Child* 44:301 (Aug.) 1932), who made a study of the same problem and who found very little variation of the Schick-positive percentages among those who had and those who had not had tonsillectomy. Among 155 children who still had their tonsils, 31.1 per cent were Schick-negative. Among 19 children who had had tonsillectomies, the number of negatives was about the same, 33.3 per cent.

In a series of 34 children with positive Schick reactions who had their tonsils removed subsequently, the change of their reactions 6 to 14 months later occurred in only 8.8 per cent of the number. Similar statistics were obtained in a larger group of children by J. A. Bigler (*Ibid* 44:728 (Oct.) 1932). He observed 325 children who were Schick-positive and had not received any treatment with diphtheria toxoid or toxin-antitoxin. These children all had their tonsils removed subsequently and 6 months after the operation they were retested with the Schick material. Ninety-two per cent remained Schick-positive. This author concluded that the immunity that is clinically apparent as a result of this operation may be due to the removal of a fertile soil for the growth of the diphtheria bacilli, or to the elimination of a portal of entry of the infection.

DISLOCATION OF HIP, CONGENITAL.—TREATMENT.

—Seventy-two cases of congenital dislocation of the hip were reviewed by M. B. Howorth and H. W. Smith (*J Bone and Joint Surg* 14:299 (Apr.) 1932). The patients were mostly between the age of 3 and 5 years of age,

the oldest being 20 years of age and the youngest 1½ years.

The authors' conclusions are as follows:

1 Closed reduction is the treatment of choice in congenital dislocation of the hip when a stable complete reduction can be obtained by described method without much traumatism.

2 Attempts at closed reduction frequently fail either primarily or secondarily. Repeated manipulations are rarely successful and often result in considerable damage to the hip.

3 The chief causes of failure of closed reduction are the obstructions offered by the constricted capsule and labrum glenoidale and the redundant ligamentum teres.

4 A shallow acetabulum with an oblique roof frequently permits redislocation. In cases with an acetabulum of this type open reduction usually, with deepening of the acetabulum, is advisable. If exposure of much bone is required a shelf operation is preferable.

5 Open reduction is almost always successful primarily. When redislocation occurs, it usually takes place shortly after the removal of the plaster. The hip, therefore, should be carefully watched at this time, particular attention being paid to x-rays made with the patient standing. Secondary manipulations to improve the reduction have been of little value.

6 The shelf operation results in less stiffening than the gouging of a new socket out of bone and is, therefore, preferable when the femoral head cannot be brought down to the level of the acetabulum or the socket is so shallow or oblique that maintenance of reduction, even with gouging of cartilage, is hopeless.

7 When the deformity is 45° , correction of anteversion is usually advisable, unless a shelf operation is done

8 Examination 18 months or more after the operation in the cases reviewed showed maintenance of the reduction in 61 per cent. of the hips, subluxation in 31 per cent, and redislocation in 8 per cent. A good functional result was obtained in 67 per cent

9 Fatigue, limp, and limitation of motion were frequent residual symptoms after open reduction of hips which had become redislocated and in those in which gouging to bone was done

10 Coxa plana is not infrequent after reductions of congenital dislocation of the hip, but seems to be unrelated to damage to, or removal of, the ligamentum teres, maintenance of reduction, or the type of operation

DUODENUM.—ANOMALIES OF DUODENUM AND COLON—

After 8 years of study, J L Kantor (J A M A 97 1785 (Dec 12) 1931) has drawn the following general conclusions regarding anomalies of the duodenum and colon

1 Anomalies may be regarded as expressions of organic constitutional inferiority or, in other words, points of actual or potential weakness in the body structure

2 Anomalies may be divided into 3 classes. those incompatible with life (congenital atresia of the bile ducts), those compatible with life but not with robust health (high grade visceroptosis), and those compatible with life and health under favorable circumstances (uncomplicated Meckel's diverticulum)

3 The general tendency seems to be for the body as a whole to compensate for the presence of an anomaly. Hence, symptoms do not occur unless this com-

pensatory mechanism breaks down. This break may result from any of the following causes

(a) Mechanical factors such as strangulation of a silent Meckel's diverticulum

(b) Infection, which may change a diverticulosis to a diverticulitis

(c) Juxtaposition of two or more anomalies, such as the presence of ectopic mucosa in a Meckel's diverticulum, which may lead to hemorrhage or perforation

(d) Old age and increasing asthenia, especially prominent in the case of all hernia and herniations, in which the weak spots exist from birth but the fully developed condition occurs late in life

(e) Associated functional instability. When neuroses and anomalies co-exist, the former furnishes the underlying functional instability—the break in compensation—and the anomaly furnishes the particular digestive symptomatology for the clinical picture

4 Because of variations in the compensatory mechanism, the symptomatology of anomalies is not continuous or progressive as in ordinary diseases. This is the chief single differential between an anomaly and an acquired lesion and is of great importance in appraising the practical significance of anomalies

Duodenal Bands.—Duodenal bands represent anatomically the unabsorbed portion of the free edge of the lesser (hepatogastric) omentum and are called variously hepatoduodenal, hepatocolic or cystocolic ligaments, depending on the actual course of the anomalous membranes. The author describes in detail his findings in cases having bands involving the second portion of the duodenum, causing displacement to the right. This anomaly was found in 48

per cent of 1754 patients studied by x-ray. Anatomical studies have given the incidence of upper right quadrant bands of 15.5 to 30 per cent. Seventy-nine per cent of these patients were females, 53 per cent were asthenic. *Symptomatically*, the patients were divided into 2 groups, those with toxic or reflex symptoms, and those with local symptoms. The various symptoms may be summarized as follows:

	This Group Per Cent	General Inci- dence (3000 Unselected Cases), Per Cent.
Nausea	44	15.0
Headaches	44	23.0
Vomiting	41	20.0
Vertigo	20	3.5

Local symptoms consisted of epigastric distress or pain, the latter often suggesting duodenal ulcer or gall-bladder disease. Change of position often gives relief.

As to *treatment*, the author favors medical therapy directed at the ptosis and malnutrition, and at improving the nervous stability. If these measures fail, surgery often affords relief.

Redundant Colon.—The redundant colon is one which is too long to fit into the body of its owner without undergoing reduplication. The distal colon is usually affected, an enlarged sigmoid loop rising well out of the pelvis.

Redundant colons were found in 16 per cent of 1614 x-rayed patients. Both sexes were about equally affected, and no habitus was predominant. The *symptoms* may be summarized as follows:

	This Series, Per Cent.	General Incidence, Per Cent.
Constipation	69	46
Gas distress	70	38
Abdominal pain	52	47

Treatment consists essentially of withdrawal of all forms of colonic abuse and

the restoration of normal function by conservative procedures.

High Cecum.—The cecum may be arrested in its embryologic descent at any stage between the liver and its normal resting place, which is the middle of the right iliac fossa. The author classifies all ceca occupying a position not lower than the upper third of the iliac fossa as high ceca. This finding occurred in 6 per cent of 1583 cases. Seventy-three per cent were males; 71 per cent were of sthenic habitus. *Symptoms* were uncommon.

	This Series, Per Cent.	General Incidence, Per Cent.
Headaches	18	20
Constipation	35	46
Appendicitis, operation	24	17
Appendicitis, pus	36	16

Low Cecum.—The low cecum is the result of embryologic hyperdescent, the organ prolapsing below the right iliac fossa into the true pelvis. The author believes that the low cecum represents true overgrowth rather than ptosis. This condition is rather frequently associated with duodenal bands, as previously described. The incidence found was 18 per cent, with women making up 72 per cent of this number. Forty-eight per cent were classified as asthenic in habitus. The general *symptoms* are toxic and local in character.

	This Series, Per Cent.	General Incidence, Per Cent.
Vomiting	43	20
Headache	38	23
Pain, right lower quadrant	13	9
Tenderness, right lower quadrant	23	19
Appendicitis, operation	24	17
Appendicitis, pus	10	16

The author believes that the local symptoms are the result of cecal stasis, while the toxic or reflex symptoms de-

pend upon cecal stasis and absorption or result from duodenal delay dependent upon a drag effect of the low cecum. In Kantor's opinion, the second hypothesis is more likely to be correct, since

the nervous symptoms, and treating the constipation or cecal stasis. Surgery is seldom necessary.

ADHESIONS, CONGENITAL.—

H E Knox (Ann Surg 95 850



Stomach pulled downward and to left, pyloric ring taut, duodenum dilated proximal to adhesions which pass from duodenum to under surface of liver (H E Knox Ann Surg)

no definite evidence of toxic absorption has been found, and cecal stasis without a low cecum is not productive of as high an incidence of toxic symptoms.

Medical *treatment* consists of treating the ptosis, adding weight, controlling

(June) 1932) calls attention to the fact that congenital duodenal adhesions are an important clinical entity, having a definite train of symptoms, and should be borne in mind particularly by those called on to operate on infants. Though

the cause of congenital duodenal adhesions has received investigation, no theory seems to have been advanced that adequately explains their formation. The adhesions may be the result of infection which originates from intra-uterine sources, traveling through or along the umbilical vessels, falciform ligament or portal vein, to the under surface of the liver or subhepatic fossa. The adhesions in 6 cases reported by the author all extended from the anterior surface of the duodenum to the under surface of the liver in close proximity to the gall-bladder. The duodenum was pulled upward and to the right, producing definite kinking. The portions proximal to the adhesions are distinctly dilated, and as the adhesions were severed, the gas was seen to pass into the distal portion. The stomach was dilated in each instance and this dilation also was relieved after the adhesions were separated. The symptoms of congenital duodenal adhesions are so similar to those of hypertrophic stenosis that this diagnosis is often made, and when no stenosis is found at operation, the subhepatic fossa should be explored for the presence of adhesions. The chief *subjective signs* are vomiting, constipation and loss of weight in a fretful, hungry and dehydrated infant, while *objectively* there are visible gastric peristalses. The vomiting occurs immediately after birth. In the early stages liquids are rejected almost as soon as they are swallowed, while, as time goes on, the stomach becoming dilated, vomiting does not occur for some time after feeding and then may become cumulative as well as projectile. Bile is usually absent in the vomitus in the early stages, but a small amount may pass the obstruction and then the vomitus will be bile-stained. The lack of

absorption accounts for the constant hunger, the persistent constipation and the progressive emaciation and dehydration. As the stomach dilates and the loss of weight continues, gastric peristaltic waves become visible. Commencing in the left hypochondriac region, they pass across the epigastrium, culminating at the pyloric region. Occasionally, the waves may pass beyond, becoming lost under the liver. Since the stomach dilates slowly, early regurgitation rather than projectile vomiting is the rule. X-ray examination is not essential for a diagnosis, and may, in fact, be misleading. The *treatment* of congenital adhesions of the duodenum is surgical and should be instituted before dehydration sets in and loss of weight occurs.

OBSTRUCTION — CONGENITAL.—*Etiology.*—According to W E Ladd (New England J Med 106 277 (Feb 11) 1932), the first case of congenital obstruction of the duodenum was reported by Calder in 1752. Since then, numerous articles on the condition have appeared in the literature, chiefly autopsy reports. In 1889, Bland-Sutton stated that the occlusion always takes place at the site of an embryological event. He attributed the duodenal atresia to excess of closure while the liver was being formed. Others have regarded syphilis and fetal peritonitis as responsible. Timely and suitable surgical intervention offers the only chance for cure.

Congenital obstruction of the duodenum is a manifestation of faulty embryological development. It is of 2 types, (1) the *intramural* or *intrinsic type*, caused by septa within the lumen of the bowel, and (2) the *extrinsic* or *extramural type*, due to external pressure on the bowel. In the 6- or 7-mm

embryo the duodenum presents a well-defined round lumen lined with epithelium. At a later stage of embryological development the epithelium proliferates, forming vacuoles within the lumen. As this process continues, the original lumen becomes bridged and subdivided by septa. The septa completely block the passage from the stomach to the duodenum. If development is arrested at this stage, the lumen of the duodenum becomes partially or completely obliterated. With normal development, the vacuoles become confluent and the central lumen is reestablished. The villi are the only remaining evidence of the projections between the vacuoles.

According to Ladd's observations, the *extrinsic type* of congenital obstruction of the duodenum is due to incomplete rotation of the bowels. Complete failure of rotation leaves the midgut, *i.e.*, the intestine from the fixed portion of the duodenum to the middle of the transverse colon, attached to the posterior abdominal wall by only a very small area at the origin of the superior mesenteric artery. Conditions are then favorable for volvulus of all of the intestine from the duodenum to the middle of the transverse colon. The author found such a volvulus in several of his cases. The point of obstruction was in the third part of the duodenum. With less complete failure of rotation, the cecum may be advanced to a point just to the right of the duodenum and there become attached to the posterior abdominal wall, thus pressing on the duodenum and constricting the duodenal lumen.

Symptoms and Diagnosis.—The clinical symptom of most importance in the diagnosis is *vomiting*. When there is complete atresia, the vomiting begins soon after birth. It is explosive in character like that of pyloric stenosis,

but differs in the time of onset. The vomitus contains bile. There is no pyloric tumor, but gastric peristalsis is visible. Confirmatory evidence of obstruction may be obtained by x-ray examination, with or without the administration of a barium meal.

Treatment.—In a review of the literature Ladd was able to find the reports of only 10 cases treated successfully by surgery. In cases of the *intrinsic type* of obstruction, especially those with stenosis rather than complete obstruction, there may be a marked megaduodenum. In such cases it is best to perform a duodenojejunostomy at once. In cases with complete intrinsic atresia the choice between gastroenterostomy and duodenojejunostomy is based on the position of the atresia. If the obstruction is above the ampulla of Vater, gastrojejunostomy should be done, but if the obstruction lies below the ampulla, duodenojejunostomy is preferable, because it affords better drainage of the distended duodenum and better contact with the pancreatic and biliary secretions.

In the small infant the anastomosis presents technical difficulties. The use of the clamp on the small distal loop is not advisable. The first layer over-and-over suture should be done with No 000 chromic catgut and is reinforced with a Connell stitch of fine silk. In such delicate tissues, coarse suture material is likely to cause leakage.

In an infant with volvulus due to congenital faulty rotation, the volvulus takes place in a clock-wise direction. The duodenum is markedly dilated, the cecum displaced, the remainder of the small intestine markedly congested and dilated, and the large bowel empty. In cases of duodenal obstruction caused by the pressure of an undescended cecum

SUMMARY OF CASES

Sex	Age	Symptoms	Type	Operation	Result
Male	4 days	Vomiting since birth	Intrinsic	Posterior gastroenterostomy	Recovery
Male	3 weeks	Vomiting since birth	Intrinsic	Posterior gastroenterostomy	Death
Male	14 mos	Vomiting beginning at 11 mos. Weight loss one-third in 5 mos	Intrinsic	Posterior duodenojejunos-tomy	Recovery
Female	4 days	Vomiting since birth	Extrinsic	Anterior duodenojejunos-tomy	Death
Female	11 years	High intestinal obstruction for 1 week	Extrinsic	Freeing of duodenum, unrotating cecum	Recovery
Male	14 days	Vomiting on 11th day	Extrinsic	Relieving volvulus, freeing of duodenum	Recovery
Male	9 mos	Acute persistent emesis	Extrinsic	Freeing of duodenum, untwisting of volvulus	Recovery
Male	17 days	Vomiting since birth	Intrinsic	Jejunostomy	Death
Male	4½ mos	Vomiting for 45 days	Extrinsic	Freeing of duodenum, unrotating of cecum	Recovery
Female	4½ wks	Vomiting since birth	Extrinsic	Freeing of duodenum, unrotating of cecum	Recovery
Female	6 days	Vomiting since birth	Intrinsic	Posterior gastroenteros-tomy	Recovery

without volvulus, the cecum should be freed from its attachment to the posterior abdominal wall and the duodenum uncovered to its junction with the jejunum. By this procedure the duodenum is relieved from all constriction.

In the author's experience the operations most successful in congenital obstruction of the duodenum are posterior gastrojejunostomy, posterior duodenojejunos-tomy, reduction of mid-gut volvulus, and liberation of cecal attachments.

Ladd reports 10 cases, which are summarized in the table.

CHRONIC OBSTRUCTION.—

R M Penick, Jr (Ann Surg 96 219 (Aug.) 1932) calls attention to the fact that duodenal obstruction due to the presence of enlarged, calcified retroperitoneal lymph nodes has received little attention in the literature on this subject. He reports 2 such cases, in which the obstruction and resulting dilatation were revealed by x-ray examination and confirmed at operation. Gastroduo-

denojejunos-tomy was done in 1 case and an anterior gastroenterostomy in the other. One patient developed a subsequent obstruction in the jejunum below the site of anastomosis, which was due to adhesions between the intestine and the mass of lymph nodes. Although the enlargement and calcification of the retroperitoneal lymph nodes were thought to be due to a tuberculous process, this was not confirmed by microscopic examination of the tissue removed or by the presence of active tuberculosis elsewhere. However, the presence of calcified pulmonary nodules in 1 case lends weight to this assumption.

Chronic *intermittent* duodenal obstruction described by H F Shattuck and H M Imboden (J A M A 98 943 (Mar 19) 1932) has been called "arteriomesenteric occlusion," "congenital fixation" and "stenosis of the duodenum," "megaduodenum," "chronic duodenal ileus," and "chronic duodenal stasis." The 2 most frequent and im-

portant causes are peritoneal adhesions or bands fixing the first and second parts of the duodenum and pressure of the mesenteric pedicle, or a sharp occlusive angle at the duodenojejunal flexure causing obstruction of the third part.

The authors review 46 cases in which the period of observation ranged from 6 months to 8 years. Most of the patients were between 25 and 35 years of age. There were 4 times as many females as males. The *symptoms* were variable, vague, and noncharacteristic. The most common symptom was a feeling of epigastric fulness and flatulence especially after meals. Several of the patients had had digestive disturbances such as constipation, vomiting and bilious attacks since childhood. Forty per cent had pain. As a rule, the pain was epigastric. It occurred immediately or from 1 to 3 hours after eating, or was continuous. It was relieved partially or completely by sodium bicarbonate, belching, enemas, or the knee-chest position. It usually ceased when the stomach became empty. Nausea and vomiting occurred in nearly 50 per cent of the cases, and constipation in nearly all. In about half of the cases there were toxic symptoms such as headache, migraine, excessive fatigue, lassitude, mental depression, insomnia, nervousness, emotional instability, and difficulty in mental concentration. The majority of the patients were of the asthenic type, with a narrow costal angle and a broad pelvis, and had a low blood-pressure, poor muscular tone, hyperactive reflexes, and signs of vasomotor instability. In more than half of the cases a diffuse epigastric tenderness was found.

Gastric analysis was negative. X-ray examination revealed varying degrees and types of duodenal distortion, but nothing characteristic of the condition.

The great majority of cases of chronic intermittent duodenal obstruction respond satisfactorily to medical *treatment*, but in a few cases conservative surgical measures are necessary.

TUMORS.—DIAGNOSIS.—Tumors of the duodenum and benign gastric hyperplasias prolapsing through the pyloric canal into the duodenum, according to E. L. Shiflett (*Radiology* 19. 79 (Aug.) 1932), occur with such relative infrequency as to justify detailed reports of cases as they occur. The diagnosis is difficult and treatment is often misdirected.

Though rare, these conditions have been established as clinical entities and they should receive reasonable consideration in the diagnosis of gastric complaints. The author reviews the literature on the subject and places on record the x-ray observations in 2 unusual cases, one a *sarcoma* of the duodenum, metastatic from an identical lesion on the thigh, the other, an hypertrophy of the gastric mucosa, lengthened out in the form of a *polypoid mass* which at times prolapsed into the duodenum.

TUMORS OF AMPULLA OF VATER.—The frequency with which tumors of the ampulla occur is indicated by the following summaries which have been collected by W. Walters (*Surg. Gynec. Obst.* 55:648 (Nov.) 1932). In 1906, Geiser collected 51 reports; in 1913, Outerbridge, an additional 59. In both groups, 20 resections of the lesion had been carried out. Mueller, in 1925, collected 30 additional reports, in 8 of which resection had been done, and in 1927, Cohen and Colp tabulated 59 cases of tumor of the ampulla which had been reported from 1899 to 1925. Fulde, in 1927, reviewed 51 cases of papillary carcinoma of ampulla of Vater.

and added 1 case of his own. In this group transduodenal extirpation was performed in one stage on 42 cases with a mortality of 42 per cent

Symptoms.—The cardinal symptoms of the lesion are icterus, distention of the gall-bladder, and chronic obstipation. Mueller called attention to the fact that probably the most common region of origin of the ampullary growth is the duodenal mucosa at the papilla, where an ulcer may develop, and that jaundice, the main symptom, is present except in a few cases in which ulceration of the lesion permits a channel to form through it for the passage of the bile. The jaundice then will be intermittent or complete, depending on whether the bile is able to seek a channel through the lesion. This fact was emphasized by Einhorn and Stetten in their case, reported in 1924. There was almost total absence of jaundice, except for a slight attack at the beginning of the patient's illness, which they accounted for by the fact that the tumor was ulcerative in type and not actually obstructive.

Pathology.—Cohen and Colp, in their summary, described in detail the histological differences between the malignant cells which take their inception from the intestinal mucous membrane of the ampulla and those of choledochal tumors. In the former the cells are clear and flat, in the latter, cylindrical and rather high. The cells of tumors which take origin from the canal of Wirsung are cuboidal. Cohen and Colp have expressed the belief that other possible sources of origin may be from the glands of Lieberkuehn and the glands of Bruenner and also from aberrant pancreatic tissue in the depth of the ampulla.

Treatment.—Walters (*Ibid*) reports a successful resection of the ampulla

of Vater, including a portion of the duodenum with choledochoduodenostomy for *carcinoma* of the ampulla of Vater. In support of the argument favoring ampullary resection in indicated cases is the relative benignity of carcinomata of the ampulla. They are mostly *adenocarcinomata* of low degree of malignancy, producing symptoms early and metastasizing late. Emphasizing the delay in appearance of metastasis, Perry and Shaw reported metastasis in 3 of 15 cases. In 4 of the cases which Cohen and Colp reported from Mt Sinai Hospital, necropsy was obtained, and in none were metastatic growths present.

DYSMENORRHEA.—INCIDENCE.—R. E. Boynton (*Am J Obst and Gynec* 23: 516 (Apr) 1932) studied the menstrual histories of 2282 university women and found the incidence of dysmenorrhea to be 20.38 per cent. The percentage of dysmenorrhea increased as the age increased up to 20 years, with a significant increase between the groups under 20 years and those over 20. The incidence of dysmenorrhea was lowest in the freshman year. In a small group of student nurses the proportion of dysmenorrhea was 6.98 per cent compared to 20.38 per cent for the university women. The size of the town in which the student has lived has no relation to dysmenorrhea. The amount of physical exercise as reported by the student has no significant relationship to dysmenorrhea. Posture has no significant relation, although the percentage of dysmenorrhea in the poorer posture groups was lower than in those with better posture. The mean systolic blood-pressure, the mean height-weight percentage, and the mean hemoglobin percentage was significantly lower for

those having dysmenorrhea than for the group having no pain. The mean vital capacity percentage was slightly higher for the dysmenorrhea group. The percentage of cases having dysmenorrhea was greatest in the lowest blood-pressure group, the lowest height-weight percentage group and the lowest hemoglobin group. The percentage of dysmenorrhea occurring in a group of students who were classified as "high strung" was lower than in a control group not classified.

ETIOLOGY AND TREATMENT.—Whatever the underlying cause of the pain in primary dysmenorrhea may be, there is much reason to believe that the immediate cause is a spasmodic contraction of the uterine muscle, according to E. Novak and S. R. M. Reynolds (J. A. M. A. 99:1466 (Oct. 29) 1932). Recent investigations as noted by S. R. M. Reynolds (Endocrinology 15:193 (Mar.-Apr.) 1932) have called attention to a method which gives the opportunity of studying the uterine contractions of the experimental animal in the unanesthetized state. The upper portion of the vagina of the rabbit is cut across; the lower end is turned in and buried, while the upper end is brought out through the abdominal incision to which it is sutured. In this way there is created a fistula which gives ready access to the animal's two uteri. By introducing a small balloon into the uterus, the effects of various stimuli on the uterine contractions can be easily studied and recorded by an air-water manometer with a kymographic attachment. Reynolds noted that during estrus there is marked uterine activity, while during the anestrus period there is only feeble uterine activity or none at all. Castration produces complete quiescence of the muscle, preceded by

progressive lessening and irregularity of the contractions. By replacement therapy with theelin in the castrated animal, the uterine motility is restored, demonstrating that female sex hormone is the factor concerned with this condition.

Finally, it has been shown that injections of urine of pregnant women inhibit, as does progesterin, uterine motility. This effect is due to the presence of prolactin (Zondek) in the urine of pregnancy. When given to rabbits showing marked uterine motility, in such small amounts that it does not affect the ovary, it still induces a profound decrease in uterine motility within 3 or 4 hours.

During the phase of activity of the corpus luteum, extending from ovulation up to a short time, at most a few days, before the menstrual onset, the effect of female sex hormone on uterine contractility is inhibited by progesterin (E. Novak). With the withdrawal of the influence of the corpus luteum, there is again a female-sex-hormone-produced excitation of uterine contractions. This general sequence presumably occurs in all normal women, and yet in only a comparatively small proportion is the heightened contractility of the uterus at this period registered as a real dysmenorrhea. Dysmenorrhea may be manifested in those patients in whom there is an endocrine imbalance between the uterine motility factors, especially sex hormone and progesterin, and the disturbance may be a quantitative or a chronological one, or both.

According to Novak, the biologic "antidote" to female sex hormone is either progesterin or a prolactin-containing substance prepared from urine of pregnancy. Novak and Reynolds have used prolactin clinically and have obtained en-

couraging results in cases of *endocrine dysmenorrhea*

According to C Mazer and L Goldstein ("Clinical Endocrinology of the Female," W B Saunders Co, Philadelphia, 1932), no satisfactory explanation of the cause of dysmenorrhea is at present available. The usual incidence of uterine hypoplasia, with or without congenital displacements of the uterus, and the presence of follicle cystosis in some of the individuals are strongly suggestive of endocrine malfunction. However, a number of them respond favorably to dilatation and curettage of the uterus. Pregnancy, likewise, often establishes a permanent cure. This relief, in their opinion, is often due to a reestablishment of a balanced hormonal function, and not to permanent dilatation of the internal os inci-

dent to delivery. Some of these patients respond to **estrin therapy**, if given in adequate doses over a long period of time. A few also respond readily to moderate doses of **thyroid extract**.

In order to produce the desired effect, the standardized hormone should be used, in quantities of 400 rat units daily, if given by mouth, or 100 rat units at least every other day, if given hypodermically, for a period of at least 2 months. These writers were able to relieve over 50 per cent of their dysmenorrheic patients. The usual failure in the treatment of essential dysmenorrhea with anterior pituitary sex hormone or with low dosage irradiation of the pituitary gland, is apparently due to the fact that pituitary deficiencies seldom give rise to dysmenorrhea.

E

EAR.—ANATOMY AND PHYSIOLOGY.—The meritorious work by the European schools on the vestibular apparatus still forms the basis of the knowledge of this subject, but in the last few years American workers have been forging to the front.

Theories.—Much has been contributed to recent literature, notably by Wittmaack, Albrecht, Schwarz, Eagleton, Friesner, Kopetzky and Almour on the mastoid structure and petrous pyramid, particularly with regard to pneumatization. According to L Kraus (Arch f Ohren, Nasen u Kehlkopf 128:307 (May 11) 1931), pneumatization of the petrous pyramid takes place in 2 ways

1. An extension of pneumatic cells from the epitympanic recess over the top of the superior semicircular canal.

2. An extension from the hypotympanic and peritubal air cells which reach the pyramid from the region below the labyrinthine capsule.

About 25 per cent of all temporal bones show this pneumatization, which runs parallel with that of the mastoid process, but represents a more advanced stage of development and is, therefore, necessarily less frequent. S R Guild, S J Crowe, C C Bunch and L M Polvogt (Acta Otolaryng 15:269, 1931) showed on the basis of a histologic study of 1200 temporal bones that the total number of ganglion cells in the spiral membrane of the cochlea (Corti's organ) ranged from 23,200 to 27,800 in young adults, 29,000 in children. The figures for each region of the cochlea were lower basal, 934 per mm of length; upper basal, 1076, lower

middle, 973 and upper middle plus apical, 502. Thus the density of distribution of ganglion cells at various levels of the cochlea corresponds roughly with the fineness of sound perception at the various levels of the tone scale, as measured by the audiometer, on the supposition that high tones are relegated to the basal and low tones to the apical end.

In ears in which there has been a loss of hearing, especially affecting the high-pitched tones, the total number of ganglion cells was found to be diminished, the deficiency being about twice as great in the basal as in either of the other regions.

These results may be compared with those obtained in the classic experiments of Wittmaack and Yoshii on the degenerations produced in the cochlea by prolonged tonal stimulation, which they strikingly confirm and extend.

MALFORMATIONS, CONGENITAL.—Among a number of interesting analyses in the literature of the pathology of such congenital defects was the work of Fraser. A case of unilateral malformation of the auditory apparatus was presented by E. W. Hagens (Arch Otolaryn 15: 671 (May) 1932). On the left, or involved side, the outer ear, external canal and the drum membrane were absent. The malleus, incus and stapes were deformed. The tensor tympani muscle was present, but the stapedius muscle was absent. A mass of thymus tissue was situated in the cavum tympani. The facial nerve was absent, and in the place of its usual third and fourth portions were 2 abnormal veins. The end-organs of the cochlear and vestibular apparatus were normally developed. However, there was no spiral ganglion or cochlear nerve tissue, although Scarpa's ganglion and the nerve

fibers to the end-organs were partially present. The internal auditory meatus was narrow, and its aperture was filled with connective tissue, so that there was no nerve connection with the brain. Of the nuclei at the base of the brain, the cochlear nuclei of the eighth and the motor nucleus of the seventh nerve were practically absent. The vestibular nuclei and tracts were present but diminished in number, while the sensory part of the seventh nerve was larger than normal. The ear and its connections were normal on the right side.

SYPHILIS OF EIGHTH NERVE.

—According to W. A. Garrott (J Tennessee M. A. 25: 95 (Mar.) 1932), syphilis of the eighth nerve occurs in 2 chief forms, *i.e.*, *neurolabyrinthitis syphilitica*, or early auditory syphilis, and *labyrinthitis syphilitica tarda*, or late auditory syphilis. Neurolabyrinthitis syphilitica responds favorably to treatment in the majority of cases, while labyrinthitis syphilitica tarda does not always respond as favorably in as many cases, but many of these are checked or stopped in their progress. The author believes that syphilis of the eighth nerve or its branches is more common than the diagnostic records of most otologists would indicate. If diminished bone conduction is just ground for suspicion of syphilis of the eighth nerve and its branches, and if it is an early manifestation of nervous system syphilis, otologists should be more alert and watch for it more carefully. Though all the auditory symptoms may not be relieved, it is important to recognize the systemic nature of the infection and cooperate with competent serologists in the treatment of it. By the same token, the serologist and the general practitioner should remember the possibility of eighth nerve involvement and consult

the otologist, and he should attempt to outline his treatment according to the degree of involvement as determined by the otologist. On the basis of his observations in 50 cases of congenital syphilis, N. Asherson (*J Laryn and Otol* 46 326 (May) 1931) concludes that the "compression nystagmus" sign is not an uncommon concomitant in patients with congenital syphilis who have received extended treatment. A characteristic lead-blue tympanic membrane is described by the author as being a typical finding in these cases. The infrequency of chronic otorrhea and the incidence of deafness in cases of congenital syphilis is commented on.

TUMORS OF ACOUSTIC NERVE—P. Northington (*Laryngoscope* 42.506 (July) 1932) states that in tumors of the acoustic nerve the duration of the ear manifestations before the diagnosis is made justifies making functional ear tests at an early date in patients having a suggestive history. When positive observations are present, a complete neurologic examination should be made. The results of the rotation tests are not reliable in indicating the vestibular impairment in tumors of the acoustic nerve. The caloric tests, on the other hand, give dependable information as to the vestibular nerve involvement. The group of observations most consistently present in verified cases is an impaired cochlear function and a total loss of vestibular reactions to temperature on the side of the tumor, with a small impairment of the vestibular reactions in the face front position on the side opposite to the tumor. Unilateral deafness was present in all of 5 verified cases observed by the author. The impairment of hearing was moderate in 2 and marked in 3. There was a greater loss of the vestibular function

than of the cochlear function on the side of the tumor.

MALIGNANT TUMORS.—G. A. Robinson (*Laryngoscope* 41 467 (July) 1931) states that more trauma and a greater exposure of the ear to the elements may be reasons for the greater frequency of malignant tumors of the ear in men than in women. A neoplasm should be suspected in meatal dermatitis not yielding to usual medications. Biopsy should be done. Severe pain, facial paralysis and granulations are symptoms of carcinoma of the middle ear. In 5 cases of malignant tumor involving the middle ear reported by the author, none of the patients were cured, but considerable palliative relief from pain was obtained by radium therapy. Seven of 19 patients with carcinoma of the external ear and auditory canal observed by him are clinically cured 3 to 7 years after radium treatment, 1 is well 6 years after electrodesiccation. Six patients treated recently are doing well and should be cured. In 4 cases the tumor involved the external auditory canal and did not respond to radium treatment, but a patient with gold radon implants is now free from tumor, the time elapsed, however, is not sufficient to report a permanence of cure. In this case metastatic nodes in the neck have yielded to high voltage x-ray therapy.

ECLAMPSIA.—SEQUELÆ.—The late sequelæ of eclampsia form the subject of an interesting investigation by M. P. Rucker (*Am J Obst and Gynec* 23 211 (Feb) 1932). In 49 clinic patients and 37 private patients in whom there was a definite history of eclampsia, recurring eclampsia was found in 75 per cent. From 16 per cent to 27 per cent of post eclamptic

pregnancies were toxic. The yield of live births per pregnancy is somewhat less after eclampsia than normal, but this can be satisfactorily accounted for by the number of toxic pregnancies that are observed at this time. Upward of 13 per cent of the private patients were found to have hypertension. There were 4 deaths from toxemia in post-eclamptic pregnancies and 3 deaths from cardiorenal disease in the 86 cases that were followed for 3 years or more. The "expectancy" for the whole group is 0.8 per cent. More tuberculosis occurred in this group than would naturally be expected.

TREATMENT.—A series of cases are presented by J. O. Arnold and T. Fay (*Surg Gyn Obst* 55:129 (Aug) 1932) illustrating a method of fluid balance and dehydration in the pre-eclamptic, dangerously threatening and actively convulsant groups, with and without chronic nephritis as a complicating factor. The results have indicated that the rational, proper balance of fluids has controlled the cerebral symptoms of headache, vomiting, stupor, convulsions and respiratory disturbances, that systolic hypertension has been favorably influenced, and that the renal function has definitely improved in the majority of cases.

Because of the absence of any mortality in this series or in the cases coming under their care since this treatment was inaugurated, and the marked beneficial and prolonged results obtained during the past 2 years, it is the authors' opinion that further continuation and refinement of this method are warranted. Certain fundamental clinical principles long recognized have been placed in a better physiologic relationship, and continued maintenance of the former temporary improvements ob-

tained by older clinical methods justify the belief that the condition known as eclampsia is subject to prevention and control along the lines of a properly established water metabolism.

In the analysis of the problem, it is evident that symptoms must be divided into those related to cerebral disturbance secondary to a superimposed hydration state with characteristic responses attributable to "water intoxication," and those symptoms and disturbances which are fundamentally responsible for the initiation of a definite imbalance in water metabolism throughout the body. That a demonstrable toxin is unnecessary for the production of the clinical cerebral signs has been well established by the physiologic work of Rowntree and supported by the clinical observations of many practical obstetricians. In the author's opinion, eclampsia is probably a syndrome rather than a "disease" and takes its origin from a variety of disturbances which produce a common cerebral reaction, indicating that no specific etiologic cause can be expected to be responsible for the various clinical manifestations of this condition. Thus, by separating the eclamptic state into its cerebral and systemic component parts, it has been possible to direct the treatment toward cerebral manifestations with striking beneficial results.

E. L. King, G. A. Mayer and T. B. Ayo (*Am J. Obst and Gynec.* 23:867 (June) 1932) comment favorably on the use of sodium amytal in the treatment of eclampsia. A series of 30 patients is reported, 20 being colored and 10 white; the majority were primiparæ. The number of convulsions prior to the institution of treatment varied from 1 to a maximum of 12; 10 women had 4 or more seizures. Only 2 patients had convulsions after the first dose of

sodium amytal, 1 developed 1 seizure shortly after the injection, the other had 2

Twenty-seven of the 30 mothers recovered

As regards the babies, 21 were born alive and were discharged alive, 9 were stillborn; 24 were known to be alive when the patients were admitted

The treatment outlined is as follows

1 On admission, $\frac{1}{4}$ grain (0.016 Gm) of morphine sulphate is given hypodermically. It may be repeated in case of slight or moderate restlessness

2 Sodium amytal, $7\frac{1}{2}$ grains (0.5 Gm), is given intravenously as soon as it can be prepared, usually within 15 to 30 minutes. If the convulsions recur, or if there is marked nervous irritability, this may be repeated as often as deemed necessary

3 As soon as the full effect of the amytal is obtained, the stomach is washed through a Jutte or similar tube, and 2 ounces of 50 per cent magnesium sulphate are administered through the tube. This drug may be repeated later orally, if indicated

5 Using the same needle, 1000 c c (1 quart) of a 10 per cent solution of glucose is administered, without insulin. This is usually repeated in 24 hours. In most cases, in addition, 50 c c ($1\frac{2}{3}$ ounces) of 50 per cent glucose are given by vein 12 to 15 hours after admission

6 At a convenient time, a soapsuds enema is given. This is eliminative, and also prepares the rectum for the rectal administration of the sodium amytal, if thought proper. This enema is repeated when needed

7 Thereafter, sodium amytal, in 3 grain (0.2 Gm) doses, is given by mouth or by rectum (the more frequent

route), every 4 hours. This is continued until it is felt that all danger of recurrence of the convulsions is past, generally 36 to 48 hours

8 Only water or a glucose and water mixture, by mouth or administered through the Jutte tube, is given until the patient is fully conscious, then a liquid or light diet, rich in carbohydrates, is allowed

9 If there is edema of the lungs, $\frac{1}{50}$ grain (0.0013 Gm) of atropine sulphate is administered hypodermically, and repeated in 3 or 4 hours, if necessary. Novatropin, $\frac{1}{20}$ grain (0.003 Gm) every 2 hours, is very reliable in such an emergency. Circulatory stimulants are given if indicated

10 If labor does not supervene spontaneously, induction by one of the approved methods is performed, generally about 48 hours after admission

11 Labor, as a rule, is allowed to terminate spontaneously. Forceps or version may be resorted to in order to shorten the second stage

It might be argued that these adjuvant measures, particularly the use of morphine, are chiefly responsible for the eminently satisfactory results obtained. In answer, the authors stress the very prompt suppression of the convulsive seizures following the injection of the first dose of sodium amytal, which is almost dramatic, and the prolonged, quiet sleep which ensues. No such results have been obtained by the writers in a fairly extensive experience with eclampsia from the use of morphine alone

E. A. Gerrard and R. L. Newton (Lancet 2:782 (Oct 8) 1932) report the present conservative treatment of eclampsia, used at St. Mary's Hospital, Manchester, the method of procedure being as follows

Hrs	
On admission	
	<i>Morphine sulphate</i> , gr $\frac{1}{4}$ (0.016 Gm.),
	<i>coramine</i> , 1 cc (16 minims)
	<i>Magnesium sulphate</i> , 10 cc (2½ drams)
	of 25 per cent solution intramuscularly, and 5 cc (1¼ drams) after each convulsion
	<i>Dextrose</i> , 1000 cc (1 quart) of 20 per cent solution intravenously repeated if necessary
½	<i>Gastric lavage</i> , leaving in stomach <i>castor oil</i> , 2 oz (60 cc) and <i>croton oil</i> , 2 minims (0.12 cc) <i>Colonic lavage</i> , leaving in colon <i>magnesium sulphate</i> , 2 oz (60 cc) (anesthesia if required)
1½	<i>Chloral hydrate</i> , gr 30 (2 Gm) per rectum or mouth
3	<i>Morphine sulphate</i> , gr $\frac{1}{4}$ (0.016 Gm.)
4	<i>Coramine</i> , 1 cc (16 minims)
7	<i>Chloral hydrate</i> , gr 30 (2 Gm.)
8	<i>Coramine</i> , 1 cc (16 minims)
12	<i>Coramine</i> , 1 cc (16 minims), <i>chloral hydrate</i> , gr 20 (1.3 Gm)
16	<i>Coramine</i> , 1 cc (16 minims)
20	<i>Coramine</i> , 1 cc (16 minims), <i>chloral hydrate</i> , gr 20 (1.3 Gm), and later <i>chloral hydrate</i> , gr 20 (1.3 Gm) 8-hourly, if required

With slight modification, a series of 100 cases were treated on identical lines. Their attitude has been entirely conservative, and in cases where the patient was in labor, the eclampsia, of itself, was not considered an indication for operative interference of any kind. When, however, a complication arose, it was dealt with on ordinary lines, as in a noneclamptic case.

No case was discharged from hospital undelivered. In a few cases induction of abortion or labor was carried out on account of persistent albuminuria after recovery from the eclampsia.

The mode of delivery was as follows:

Natural forces	54
Induction followed by delivery by natural forces	7
Abortion	8
Induced abortion	3

Forceps	17
Version and extraction	1
Breech extraction	1
Cesarean section	1
Craniotomy	1
Five cases died undelivered	

The maternal mortality was very much diminished with this treatment, being only 7 per cent in contrast with 19.8 per cent before this method of treatment was instituted. The authors advocate strongly the use of a routine heart stimulant in view of the fact that heart failure is the cause of death in so many cases.

Thyroxine has been found of distinct therapeutic value in eclampsia and preeclamptic conditions by H. Kustner (Klin Wchnschr 11 1016 (June 11) 1932), who bases his therapy on the theory that an uncompensated hyperfunction of the posterior lobe of the pituitary gland is an etiologic factor of eclampsia and also on the assumption of an antagonism between the posterior pituitary and the thyroid. He found with thyroxine therapy that of the 3 main symptoms of eclampsia, *vis*, increased blood-pressure, retention of fluid and protein elimination in the urine, the fluid retention is most favorably influenced, in that the fluids are forced out of the tissues and into the blood stream and then are eliminated. For this reason thyroxine seems most effective in the types of eclampsia without hypertension but associated with considerable edema and a disturbed kidney function. The use of thyroxine therapy is very effective in preeclampsia and in such conditions as dropsy and nephropathy. The author does not desire to overemphasize thyroxine therapy but only wishes to point out that in many instances of eclampsia the administration of thyroid secretion can be ex-

tremely effective. He adds that large doses of thyroxine do not exert an injurious effect on mother or infant.

ECTOPIC GESTATION.—
DIAGNOSIS—O von Franque, of Bonn (Med Klin 28 989 (July 15) 1932), calls attention to the fact that, although there may be significant warning signs, there is often no missed menstrual period, since (according to his estimate) the ovum may be embedding for from 7 to 18 days before the next period falls due. When bleeding occurs it is, of course, liable to be mistaken for a period, though it is often too early, but it does not cease within the time limits of a period, while in a very early intrauterine abortion the bleeding often does cease after a few days. During all this time the enlargement of the tube is so slight as not to be palpable even by an expert examiner. The Aschheim-Zondek test may thus be useful here, for in cases of pregnancy it is usually positive a few days after the first missed period, and at any rate it is positive at a time when by no other means could the fact of pregnancy be certainly established. Unfortunately, the reaction becomes negative 8 to 12 days after death or expulsion of the ovum, or even after 3 days if there has been gradual interference with the placental circulation. The reaction is, therefore, of value only if it is positive. If death of the ovum has occurred, the gynecologist may elect to wait rather than to operate immediately; the gradual disappearance of the positive reaction may be observed and operation may never be necessary unless absorption is unduly slow or bleeding protracted.

DIFFERENTIAL DIAGNOSIS.
—Franque believes that diagnosis of

unruptured and undisturbed tubal pregnancy is possible only in isolated cases. The differential diagnosis between a tubal pregnancy and an ovum growing only in one-half of a normal uterus may be confusing, but the latter condition is happily rare. A retroflexed uterus may be taken for a hematocele in Douglas's pouch. The indefinite boundary of a hematocele, its immobility, its tenderness, and the relation of the uterosacral ligaments as felt per rectum should enable the distinction to be made, especially if the examination be carried out under anesthesia. Hohne, he says, has reported a case in which a still intact tubal pregnancy was diagnosed by a decidual cast of the uterus. This is usually passed only after death of the fetus, but it may be the first cause of bleeding, and he emphasizes the importance of examining carefully everything discharged from the uterus when tubal pregnancy is suspected. He states that there is always pain on the side of the pregnant tube, if the pain is right-sided, appendicitis may be its cause, but since in either case laparotomy is indicated, this is of little moment; a median incision should be made to allow complete exploration of the pelvis. In appendicitis the pain and swelling tend to be higher up; the leukocyte count tends to be increased, and the red blood corpuscle sedimentation rate accelerated. In uninfected ectopic pregnancy both are likely to be normal. The early signs of pregnancy and the vaginal bleeding too are helpful, though it is important to note that the latter may be very slight and visible only on vaginal examination, or even through a speculum. Occasionally, appendicitis and tubal pregnancy may co-exist, and there may be a causal relationship between them. In diagnosis between appendicitis and inflammatory

tubes on the one hand and extra-uterine pregnancy on the other, pulse and temperature are of little use, as both may be little raised or even quite normal, but a high temperature excludes a simple noninfected ectopic gestation, whereas complete pulse loss can occur without any internal bleeding in perforating peritonitis

When a catastrophic rupture of a pregnant tube has occurred, the signs are usually characteristic, *i e*, peritoneal shock, abdominal pain and meteorism, small and rapid pulse, air-hunger, faintness, and pallor. Shoulder pain may be present, but may also occur in appendicitis and cholelithiasis. There is usually dulness in the flanks, but fluctuation is absent on account of the coagulation of the effused blood. If a woman in previously good health is suddenly seized with severe abdominal pain accompanied by meteorism, loss of pulse, pallor, coldness of the extremities, giddiness, and faintness, the surgeon's first thought should be ruptured ectopic gestation, no time should be lost in attempts at differential diagnosis, but immediate laparotomy carried out. Although ruptured ectopic pregnancy is the most likely finding, the lesion may be a perforating peritonitis of any kind, torsion of an ovarian tumor or of a myoma, or one of the rarer causes of intraperitoneal hemorrhage. A case has been recorded in which a ruptured ectopic gestation was mistaken for acute poisoning and the stomach pump applied.

TREATMENT.—Franque (*Ibid*) holds that if the patient is not acutely ill, expectant measures may be adopted at least for a time—bed, ice-bag to the abdomen, and possibly ichthyol and glycerine tampons to the vaginal vault. Should the swelling increase or

the patient's condition deteriorate, operation must be immediately undertaken. He condemns the use of protein shock therapy to hasten absorption and also exploratory puncture, whether through the vaginal vault or abdominal wall. This measure should never be adopted by the practitioner, and only exceptionally in hospital, and never without all preparations made for immediate operation.

ECZEMA.—ETIOLOGY.—The etiology of eczema is slowly and gradually becoming clarified. Contrary to the older belief that eczema is almost entirely due to endogenous metabolic disturbances, a theory is assuming prominence now, according to W. J. MacDonald (*New England J. Med.* 207:940 (Nov 24) 1932), that the disease is exogenous and allergic in the majority of cases.

Quantitative and qualitative urine analysis and blood analysis has been of little value in revealing a constant metabolic etiology. Nevertheless, these investigations have been necessary to arrive at a proper understanding.

Exogenous Causes.—The dermatologist today is much interested in tracing the cause of eczema to some external factor. The individual, from infancy to old age, is met on all sides with irritation from many sources. It resides in the powder applied to the infantile skin; on toys vividly colored and invariably in the child's mouth; in hair lotions, hair tonics, face creams, skin cleansers, eyebrow pencils, and innumerable cosmetics, as well as patent medicines, plants, soaps, hand cleaners, silken goods, rayon, unwashed clothing, shoe dyes, wall paper, etc.

The first essential when faced with an acute eruption in a patient, is to

eliminate, if possible, exogenous causes by performance of patch tests

THE PATCH TEST—This test should be known to all practicing physicians. The supposedly offending substance, whether plant, drug or toilet accessories, is applied to a small square of damp linen, which is laid on the skin, covered with a larger square of rubber tissue which, in turn, is finally overlaid with a still larger square of adhesive tape. The rubber tissue is necessary because adhesive tape, being a primary irritant, might confuse the reading. The reading is done 24 to 48 hours later. The patches are most conveniently placed on the patient's back. All suspected articles should be tested.

While valuable, this test has certain limitations. It is of use only in studying acute eczema. Furthermore, if the substance which is considered to be the offending agent is a primary irritant, a reaction would naturally be expected, not only on the hypersensitive skin, but on normal skin as well. For that reason it is necessary to dilute the suspected substance, if it is a primary irritant, until it is noninjurious to normal skin. Also the patch test could only be used with substances with which the patient has been in immediate contact. The type of reaction found on removing the patch should much resemble that of the disease under scrutiny.

THE SCRATCH TEST—MacDonald points out that certain types of eczema are caused by incorrect food. This type may have existed for years, but with seasonable exacerbation. It is generalized at times and is usually more infiltrated upon the flexural surfaces, and is extremely itchy and nonexudative. The skin tends to be dry, the hair thin and brittle, and a cutaneous response to cold is marked. It would suggest almost an

endocrine deficiency. There may be an increase of uric acid, urea nitrogen and nonprotein nitrogen in the blood. But correction of these factors is not curative, even though this move may be of value. In this form of eczema, the etiology is to be found, if possible, in exactly performed scratch tests, using food proteins, animal emanations, furs, pollens, feathers, but mostly foods.

Technic—The scratch test is performed by applying to small scratches, equal in size, proteins of the various substances to be tested. It is not necessary to make large scratches and blood should not be drawn. Small scratches are painless and even children submit readily. The knife used to make the scratch should be very sharp and a special type can be obtained from instrument makers. Normal skin is chosen. The response may be noted in one-half hour, but a 6- and 24-hour reading is also desirable. A positive reaction need not of necessity be dramatic as regards size. Foods, as a rule, do not provoke marked reaction. The reaction is positive, not because it attains a certain size, but because, comparatively speaking, it is objectively more sizeable than a control or other nonreacting substance. In performing these tests, it is customary to scratch through a drop of N/10 sodium hydroxide, which contains the protein for that test. It is remarkable how often food substances, such as potato, cocoa, milk, eggs, and the cereals, especially wheat, will give definite reactions when the technic has been carefully followed.

This type of eczema is often associated with asthma. At certain times, the asthma abates and eczema appears. It may be that a periodicity of spontaneous desensitization and sensitization of the cutaneous and bronchiolitic cellular

systems is the factor at work in such phenomena

Infantile Eczema.—Diet is regarded as the principal causative factor in infantile eczema by O'Keele, Rackemann, Duke and others. The former 2 investigators suggest that the food proteins pass into the blood stream and into the maternal milk, thus sensitizing the child. Egg, milk, potato, wheat and oats appear to be the most frequent foods responsible. Elimination of these from the diet has given encouraging results.

L. Bivings (South M J 25 223 (Mar) 1932) considers most infantile eczema to be allergic in origin. Cow's milk, eggs and wheat are the most common offenders, but many errors and failures will result if they are the only factors considered.

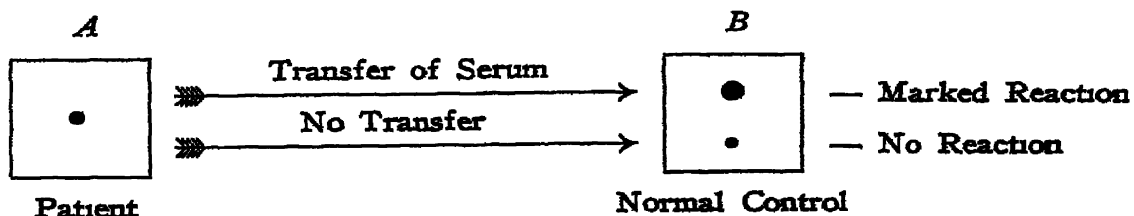
Allergic Explanation of Eczema.—Various types of eczema are daily seen. The chronic, infiltrated, extremely pruritic, occasionally confluent and plaque-like lichenified type taxes the skill of the diagnostician to the utmost. This affection is common on the nape of the neck and upon the lower halves of the legs. Coca points out that not rarely the exciting cause may not be a specific one, but an infection, which when removed, clears up the allergic manifestations.

MacDonald points out that neurodermite, so consistently found with certain signs of cholecystitis or chronic hepatitis, is a cutaneous allergic response to hidden infection which it may be impossible to diagnose by any of the laboratory tests.

Explanation of Allergic Skin Disease.—According to Coca, the allergic skin affections are: (1) contact dermatitis, and (2) atopy. Contact dermatitis is due to surface contact with an excitant, such as poison ivy plant. By atopy is meant a number of clinical conditions, such as asthma, hay-fever and eczema. No antibodies are found in contact dermatitis.

PRÄUSNITZ-KUSTNER REACTION.—By this method, antibodies in allergic skin diseases are demonstrable. It is not, however, applicable to all forms of eczema. If the patient is suffering from an allergic type of skin reaction which might be due to milk or eggs, 0.05 c.c. of his serum is injected into a normal person, and 24 hours later, either by the injection intradermally or by the scratch method 0.02 c.c. of the suspected excitant is injected in the same area. Simultaneously, a control of this infected substance is made in the normal skin of the second individual. A wheal or erythema at the prepared site, greater in size than the control, indicates fairly conclusively the transference of specific antibodies from the patient to the normal individual. It proves, of course, the presence of sensitizing antibodies in the patient's blood. The Prausnitz-Kustner method is mostly of value when the eruption is due to food or drugs. If the antibodies are still fixed, the method will show no reaction, but it is certainly of value, as MacDonald maintains, in studying the toxicodermas.

Under certain circumstances, epidermophytosis may resemble eczema, but in



the former the cause is a form of vegetable life and should be easily identified microscopically on a glass slide with the use of a solution of 15 per cent sodium hydroxide

TREATMENT—J Levy and A S Finkelstein (J M Soc New Jersey 29 189 (Mar) 1932) have replaced the milk diet in 40 infants suffering with eczema by a soy bean preparation. After a lapse of 4 to 9 months, 38 infants have improved and only 2 were not benefited. The babies gained satisfactorily. In the authors' experience, the use of a milk-free diet, in which milk was replaced by a soy bean preparation, has proven valuable as a substantial therapeutic diet in infants with severe eczema.

ELECTROTHERAPEUTICS AND ELECTROSURGERY.—

Electrosurgery owes its birth to the experiments performed by d'Arsonval and Oudin about 1907. Considerable credit for the present status of this method, according to B F. Boland (Am J Phys Therapy 9 61 (June) 1932) is due William L. Clark, of Philadelphia, who has studied and made effective the results of these methods. In this type of surgery, electricity is used for the destruction of diseased tissues.

The safety and ready controllability of this agent are two of its most important advantages. In many instances where surgery with the knife was and still is considered dangerous and inaccessible, this method will produce satisfactory results. It is clearly pointed out by the author that electrosurgery is not a substitute or alternative method of doing what has been done by other methods, but it often succeeds where surgery and radium have failed.

Cushing states that the sense of se-

curity due to the vast improvement in technic of hemostasis has led to undertakings which would have previously been foolhardy. The use of desiccation, cutting and coagulation by high frequency currents has been demonstrated by many other workers.

Only a limited degree of success may be expected from the dependence upon any single method of approach to the problems. Neither radium, x-ray, the cold scalpel or electrosurgical methods can be classified as a panacea and it is only by the judicious use of all combined that most gratifying results may be expected.

A working knowledge of the terminology used in electrosurgery is essential to the proper interpretation of the results of its use. *Medical diathermy* is considered when the heat reached is up to 116° F (46.7° C), retaining it within physiological limits without damage to the tissues. *Surgical diathermy* is that form of application of the high frequency current to the degree of actual tissue destruction proportional to the amount of heat generated. To avoid confusion, electrosurgery applies to the application of surgical diathermy.

Generation of heat by fulguration, electrolysis, galvanocautery and the Paquelin or Percy cauteries results in cauterization or actual burning of the tissues with which it comes in contact. The heat here is red hot when applied to the tissue, while in electrosurgery the heat is generated after the electrode has come in contact with the tissues.

The effects of electrical shock, chemical action and molecular changes that are commonly found in commercial currents are removed by the high frequency of the current used. To accomplish this, it is necessary to arrange for a reversal of the flow of the current at the

rate of a million times per second. Regular flow of current is known as the "undamped" type, while any irregularity in the flow of the current entitles it to the name of "damped." Thus, dehydration, cutting and coagulation, all the currents used in electrosurgery, are of the former type. To produce cutting, and at the same time dehydration of the edges of the wound, it is necessary to have the active electrode energized with a relatively high frequency current which has wave trains whose oscillations lie between those of the undamped and highly damped current.

Modification of this wave train will result in the production of a current which will cut without dehydration and coagulation or coagulate and dehydrate without cutting.

There are 3 distinct ways in which high frequency currents may be used, *viz*, (1) superficial dehydration, (2) cutting, and (3) tissue coagulation.

In *superficial dehydration* or desiccating work the active electrode is held close to the tissue but not in actual contact with it, and the sparks are allowed to traverse the intervening space. If a greater amount of destruction is desired, the needle may be inserted directly into the mass. This current is of relatively high voltage and low amperage. This type of current is largely used for the destruction of **benign or malignant growths** of small size where a cosmetic effect is desired. By this method removal of **growths from the cornea and vocal cords** has been accomplished without impairment of speech or vision.

In the *cutting current* the cutting is done by an electric arc which forms ahead of the electrode and not by the electrode itself. By volatilizing the tissues, the arc separates the tissues similar to the cutting of a knife. Modification

of this current determines the amount of coagulation or dehydration which is accomplished at the severed edges. A reduced current is suitable in those instances, particularly, where there is little vascularity, where the blood supply is greater, an increased current will produce more dehydration. For deep incisions it is necessary to have a strong current.

Coagulation current is usually more penetrating and intense than that used for desiccation. The tissue around the electrode is heated to a degree depending upon the density of the current and the length of time of application. When the current is too strong, the tissues become dehydrated too quickly, carbonization takes place and the current ceases to flow.

A bipolar high frequency current of the d'Arsonval type is used in coagulation. **Larger tissue growth and bone involvement** are attacked by this form of current. A slough is formed which separates in about 10 days to 2 weeks. Bone requires about 6 weeks to sequestrate. The removal of superficial tissues is necessary to permit the treatment of the base of the wound by the current. This is best accomplished by curettage or excision.

As for technic, the author suggests the practice of these methods upon pieces of raw meat before attempt is made to utilize them on patients. The great difficulty encountered is the fact that surgeons attempt to use their usual technic of mechanical pressure and force as they do in general surgical procedures. *Gentleness is of paramount importance and all trauma should be avoided.* The author believes that all surgeons should be familiar with the methods of electrosurgery and be able to use them, as there is no field of surgery in which

desiccation and coagulation cannot be applied to advantage

The reimplantation and dissemination of cancer cells into the healthy tissue with metastasis into inaccessible regions following knife dissection has been the worry of every surgeon. It is also an experience which all have had to their disappointment. Complete removal and destruction of the neoplastic cells are the aims and indications for the use of electrosurgery.

It is also beneficial in the removal of an original focus of infection such as a chronic endocervicitis.

To the author, the penetration of the affected tissues and devitalization of the cancer cells by the electrosurgical currents to seal the blood-vessels and lymphatics is an accepted fact. To him, they also remove the probability of metastasis and preserve much healthy tissue. The thermic sensitiveness of some neoplastic cells to desiccation and coagulation is effective at a lower degree of heat than normal cells.

The importance of the type of cancer cell to be subjected to electrosurgery is stressed by Broder. Highly malignant melanotic epithelioma and basal cell epithelioma are both cancer, but neither is in the same division. In the malignant type of neoplasm, where the aim of continued treatment by radiation is only a palliation, this continued treatment may be the source of continued stimulation of growth. Here electrosurgery is worthy of consideration. When the lesions are surgically inoperable and radio-resistant, it is possible with excision or coagulation to destroy at least part of this growth which was not amenable to other forms of treatment.

Wyeth stresses (1) the extent of the disease; (2) the degree of malignancy

of the tumor, (3) the radio-sensitivity of the lesion, and (4) the accessibility to treatment and the general condition of the patient as factors of importance in treatment of any given malignant condition.

On the obstetrical service of the Boston City Hospital, the author reports at least 6 pregnant women at term, with a cancer of the cervix, who had never even had prenatal care. The examination of such cases and the correction of many erosions would certainly lead to a limitation of the frequency of subsequent neoplastic changes.

The application of short waves to dermatology has been stressed by M. Saidman (*J de méd et chir prati* 103 103 (Feb 10) 1932). His apparatus consists of one type of diathermy, *infradiathermy*, according to the accepted term of d'Arsonval. It has 2 triode lamps of 250 watts each and takes approximately 6 amperes on 110 volts. The thermic amperemeter has a maximum intensity of 4 amperes. The length of the wave is 16 meters and usually circular electrodes 10 cm in diameter are used. The alleviating action with the absence of all but very little heat is most beneficial in facial and sciatic algia and in sympathetic algia. This same apparatus has given very beneficial results in the treatment of pruritus and Raynaud's disease and there is a eutrophic action in the treatment of cutaneous ulcers. This short wave apparatus combines the action of the bistoury and electrical coagulation.

J. Kowarschik (*Brit J Phys Med* 6-245 (Mar) 1932) states that there are 2 methods of *diathermizing the brain*. The first is the transverse method in which 2 small lead electrodes are placed upon the temples and fastened with a bandage. The second method is

similar, only the current is sent through the head in a sagittal manner. One electrode is placed on the forehead above the eyebrows and the other at the back of the head at a level of the hair border. The latter will result in the warming of the frontal lobes, the mid-brain, the pons, the medulla oblongata and the cerebellum. To avoid dizziness, the author suggests the recumbent position for the patient and the treatment should not extend over 15 to 20 minutes. The results to be obtained from this procedure are a decrease in blood-pressure, a regaining of consciousness in uremia, a diuresis, an increase in the basal metabolic rate and an effect on the activity of the generative glands.

According to J. C. King (South M. J. 25: 813 (Aug.) 1932), the successful application of *induced fever* in afebrile disease necessitates the knowledge of the physiologic changes produced by the hyperthermia as well as an understanding of the pathology of the disease under consideration. The satisfactory results in the treatment of *dementia paralytica* indicate to the author that this is the method of choice. Pyrexia causes a marked dilatation of the arterioles and the capillary bed and this is sorely needed in syphilitic changes. By the administration of *antisyphilitic intravenous medication* immediately before *diathermy* the pathologic processes are so altered and the resistance of the spirochete lowered to the point where this combination is most effective. In *gonorrhea*, *diathermy* combats the disease by the bactericidal effect of heat and through increased vascularity, which hastens the resolution of chronic processes. Although a distinct improvement in the symptoms is to be derived from the use of *diathermy* in the treatment of *thromboangiitis obliterans*, bron-

chial asthma, multiple sclerosis and chorea, the results obtained to date are not commensurate with those secured in *dementia paralytica*, chronic arthritis and gonorrhea.

ENCEPHALITIS.—ETIOLOGY AND PATHOGENESIS.

—In using the term encephalitis in its generic sense, meaning an inflammation of the brain, many conditions are included. There are varied etiological factors, suppurative and nonsuppurative. J. H. Globus (Arch. Neurol. and Psychiat. 28: 810 (Oct.) 1932) takes up the subject of nonsuppurative encephalitis or encephalomyelitis and uses the term to designate only those conditions in which an infectious agent may be postulated with reasonable certainty as the etiologic factor. He draws a fine distinction between *inflammatory disease* and inflammatory reaction, the former a primary disease process independent of other co-existing lesions and in which some of the essentially morphological characteristics of inflammation, such as exudation, proliferation and alteration, occur. The latter, *inflammatory reaction*, may present only one of the features of inflammatory disease and occur in association with distinctly noninflammatory lesions, as wounds, neoplasms, or circulatory necrobiotic disturbed areas, the *tempo* with which it develops is also slower. The condition is designated further by the type of cellular infiltrations—definite mobile, mesodermic cells (except compound granular cells). He definitely excludes so-called encephalitis due to toxins, *e g*, arsphenamine, alcohol, lead, etc.

By making a comparison of the various inflammatory diseases of the central nervous system, Globus finds striking confluency of all encephalitic forms,

and minor histological differences express the degree rather than the character of the pathological process. The essentially inflammatory diseases include (1) polioencephalitis of the Heine-Medin type, (2) acute epidemic encephalitis, (3) rabies encephalitis, (4) postvaccinal encephalitis and related postinfectious encephalitides, (5) acute disseminated encephalomyelitis with closely related multiple sclerosis, (6) encephalitis periaxialis diffusa of Schilder, and (7) syphilitic forms of encephalitis.

The *toxic encephalopathy of measles* is reported by A. Ferraro and I. H. Scheffer (*Ibid* 27:1209 (May) 1932) on the basis of 2 cases in which an overwhelming toxic reaction of the nervous system was characterized by degenerative changes of marked character in the ganglion cells, swelling of oligodendroglia and formation of rod cells and compound granular cells from the microglia. There was no evidence of meningeal involvement. These findings are contrasted with other findings reported in measles and other encephalopathies, *e g*, perivascular glial proliferation, perivascular demyelination, involvement of white matter chiefly and with little ganglion cell change. The authors hold that measles encephalitis is a toxic condition in which the toxin is not so overwhelmingly powerful as in the 2 cases reported.

In *acute rheumatic fever*, N. W. Winkelman and J. L. Eckel (*Ibid* 28:844 (Oct) 1932) believe there are ordinarily no specific brain changes, but in those cases showing definite neuropsychiatric symptoms during the course of the disease, they noted changes quite similar to those in other acute infections and toxemias. These changes consist mainly in: (1) acellular areas, (2) end-

arteritis of small vessels related to edema of the brain and toxic vascular irritation, (3) foci of glial proliferation, (4) meningeal dilatation from edema. They state that embolic phenomena may occur in the presence of endocarditis, and purpura of the brain becomes a possibility. The part that edema plays, however, they believe has been underestimated.

Concerning the etiology of the encephalitides, the survey of T. M. Rivers (*Proc A Res Nerv and Ment Dis* p 49 (Dec 28) 1931) of the relation of filtrable viruses to diseases of the nervous system is very timely. Although the question of the exact nature of the filtrable viruses, whether they are animate or inanimate, is still debatable, all evidence points to the fact that they are very small and highly contagious. Rivers ventures a tentative classification of filtrable virus affections of the nervous system based chiefly on the tissues involved.

- A. Nervous system predominantly involved, especially the gray matter, *e g*, rabies, acute anterior poliomyelitis, epidemic encephalitis, Borna disease
- B. Nervous system involvement only part of the picture, the white and gray matter about equally affected, *e g*, herpes zoster, mumps, canine distemper
- C. Nervous system experimentally infected, with tendency to pronounced meningeal involvement, *e g*, vaccinia, psittacosis, yellow fever
- D. Nervous system involved during convalescence, with both white and gray matter involved, but perivascular demyelination the striking feature, *e g*, vaccinia, smallpox, measles, varicella, influenza.
- E. Demyelinating diseases, with pathological pictures somewhat similar to that of diseases such as multiple sclerosis, Schilder's disease
- F. Miscellaneous group, as the toxic encephalitides.

In a brief discussion of the portals of entry and mode of dissemination of the viruses, Rivers appears inclined to the view of transmission along the axis cylinders, as suggested by recent experimental work in anterior poliomyelitis, rabies and herpes. He does not subscribe to the view that the virus of herpes zoster is definitely related to that causing varicella.

R. Thompson (Arch Path 12 601 (Oct) 1931), in considering the etiology of *postvaccinal encephalomyelitis*, states that this affection was first recognized in England in 1922, but attention was not called to it until 1924 by Lucksch. It is characterized by cerebral symptoms, as headache, fever, vomiting, strabismus and clouding of consciousness, often by paralysis of the upper motor neuron type, with spasticity and Babinski sign, and generally by an absence of ocular muscle involvement. In 82 per cent of the cases the onset occurs between 7 and 14 days after vaccination. On histologic examination, perivascular and marginal zones of demyelination and perivascular infiltration of proliferated glial cells are found. There is very slight nerve cell involvement. Among the etiologic views postulated are: (1) that it is an allergic reaction, (2) that the vaccination activates some unknown virus, for both of which there is no direct evidence; (3) that it is a direct vaccinia virus effect. Although most observers favor the latter, there are objections to this in the lack of demonstrable virus in the brain experimentally and the difference in the pathology between the affected brains of man and animal.

PATHOLOGY.—The chronic progressive, subcortical encephalopathy of Binswanger is reported by F. J. Farnell and J. H. Globus (Arch. Neurol

and Psychiat 27 593 (Mar) 1932) under a change of title, *i.e.*, *chronic progressive vascular subcortical encephalopathy*. The pathology of this condition is characterized by a progressive degeneration of the deep layers of the white matter of the cerebrum, particularly pronounced in the occipital and temporal lobes. The gray matter is not involved. Clinically the disease appears usually after the fiftieth year and is evidenced by impairment of memory and intelligence, which begins rather insidiously. There are defective speech, convulsions and apoplectic seizures, with occasional focal cerebral symptoms. The pupils are rarely altered and the disease progresses slowly until death. The authors report a case in a woman, about 40 years of age, who showed pyramidal tract involvement and intellectual impairment. Necropsy showed typical findings of the disease, as described, and the authors comment upon its resemblance to Schilder's disease.

G. V. T. Borries (Rev d'oto-neuro-opt 9 557 (Oct) 1931) observed several cases of *otogenous encephalitis of the nonepidemic type*, in which evidence of cerebral involvement occurred with ear infection and in which the spinal fluid was normal. The patients may recover or die without surgical interference. At necropsy no abscess is found, but an encephalitic process without pus. The author advises against cerebral puncture in these cases.

DIFFERENTIAL DIAGNOSIS. C. F. McKhann (Arch Neurol and Psychiat 27 294 (Feb) 1932) discusses the question of the encephalic effects of lead poisoning in children and concludes that cerebral manifestations are more common than neuritis, the latter rather than the former occurring more frequently in adults. The chil-

dren obtain lead most frequently from nipple shields, water and paint. The symptoms of cerebral involvement are vomiting, often of a projectile nature, visual disturbances, delirium, stupor, coma or convulsions, hyperpnea, choked discs or suture separation. If the child survives, there may be permanent residuals, such as blindness, palsies (cerebral), internal hydrocephalus, convulsions and mental deficiency. The diagnosis of *lead encephalitis* in children depends on finding a lead line in the gums (uncommon), basic stippling of erythrocytes, increased reticulocytes, finding the metal in the excreta, and x-ray evidence of its deposition in the bones. The *treatment* suggested is deduction of increased intracranial pressure by dehydration, magnesium sulphate, 25 per cent solution, intramuscularly in small quantities, and the administration of calcium and viosterol.

TREATMENT.—L Cornil and F Blanc (Rev neurol 2 123 (July) 1931) describe a case of mild *varicella* that developed *herpes zoster* in the first and second divisions of the *trigeminal nerve*. Great therapeutic benefit was derived from injection of 20 c c of blood from a patient recovering with *herpes zoster*. The author emphasizes the relationship between *varicella* and *herpes*.

EPIDEMIC ENCEPHALITIS.—**PATHOLOGY.**—The histopathology of 6 cases of postencephalitic diseases was studied by S Kornyei (Arch f Psychiat 92 372, 1930). These showed increased glial proliferation in the substantia nigra, some in the pallidum, and very little in the striatum. Kornyei believes the process is essentially a degenerative one subsequent to an acute inflammation and is not due to progressive activity of the virus. He differentiates genuine parkinsonism by its char-

acteristic vigor and primary pathological affection of the pallidum in contrast to postencephalitic parkinsonism with its characteristic symptom of akinesia and chief affection of the substantia nigra.

SYMPTOMS.—H Steck (Schweiz Arch f Neurol u Psychiat 27 137, 1931) conveniently classifies the *mental aspects* of postencephalitis into behavior disorders and bradyphrenia. The behavior disorders occur chiefly in the younger individuals and are manifested by irritability, hyperactivity and poor restraint of sexual appetite, food-seeking and the possessive instinct, the so-called "emotional incontinence." Bradyphrenia, or slow mental activity occurs chiefly in adults and is characterized by poverty of ideas, stereotypy, euphoria. Occasionally, these patients become psychotic and are subject to depressions, anxiety states, hallucinations, obsessions and impulsions. Ozerezkowsky and Dsagarov (Rev psychiat neurol and reflexol 5 6, 1930) reported 3 cases of epidemic encephalitis that had marked obsessive neuroses. These chiefly were related to sexual ideas, and the patients had quite good insight into their condition.

The late *ocular manifestations* in epidemic encephalitis are reported by M Teuhères and J Beauvieux (Rev d'oto-neuro-opht 9 349 (May) 1931), who classify these as follows:

1 Paralysis or deficiencies of the ocular musculature. Generally these partake of the nature of paralysis of convergence, difficulties in accommodation, and external strabismus. Parinaud's syndrome (impaired upward gaze) and isolated muscular palsies are rare.

2 Ocular bradykinesia or alterations of tonus. This is illustrated by fixed gaze, cogwheel phenomena and pupillary

and palpebral bradykinesis. The ocular movements are initiated slowly and occur by jerks.

3 **Excitomotor syndrome or ocular spasms.** This is manifested in the familiar oculogyric crises and clonic blepharospasm. The authors believe that ocular sensory manifestations, as amaurosis with or without appreciable ocular lesions, are probably due to encephalitis.

SEQUELÆ.—The *neurologic sequelæ* of epidemic encephalitis are discussed by M. Riser and P. Meriel (*Ibid* 9:297 (Apr.) 1931) on the basis of a study of 400 cases. True sequelæ are listed as (a) definite paralyses of extrinsic or intrinsic ocular muscles, (b) flaccid paraplegias, as transverse myelitis or spastic paraplegia, which is rare, (c) ordinary hemiplegia from foci of softening or hemorrhage, (d) permanent sensory disturbances of the thalamic or juxtathalamic hemialgic type, (e) internal hydrocephalus causing headache, vomiting and vertigo, (f) chronic disturbance of metabolism of water, fats and carbohydrates; (g) amyotrophic paralyses, (h) deformities of the extremities in certain cases of parkinsonism from tendon retractions.

"Prolonged forms" of epidemic encephalitis are not true sequelæ, but are signs resulting from the continued activity of the virus. Their manifestations are classified as

1 **Dystonic states,** disturbances of the extrapyramidal motility. These are further divided into the *permanent type*, of which parkinsonism is the example, characterized by disturbances of motility and station. In parkinsonism a static disturbance of station, with exaggeration of the tonus of posture and disturbance of motility (hypokinesia) exists. The *parodystic type* determines

abnormal but not fixed attitudes, to which a clonic element is added. The sudden variations of the tone cause complex movements as torticollis and athetosis.

2 **Organic functional disturbance,** neurovegetative and metabolic, and troubled sleep, accompanied by dystonias. This is exemplified by spasmodic polypnea, cough, hiccough, respiratory tics, hyperthermia, tachycardia, bradycardia, hypotension, obesity, diabetes insipidus, adiposogenital syndrome, insomnia and hypersomnia.

3 **Mental disturbance,** chiefly depressive syndromes and bradypsychia, but occasionally psychomotor excitation.

TREATMENT.—*Epidemic encephalitis* from the treatment standpoint has been reviewed by J. B. Neal and M. Bentley (*Arch. Neurol. and Psychiat.* 28:897 (Oct.) 1932) as follows:

I **Methods of destroying the infecting agent**

A **Chemical.** Acriflavine, salicylates, iodine preparations, colloidal metals, arsenicals and mercury.

B **Febrile.** Malaria, baths, etc.

C **Serums.** Convalescent, Rosenow's encephalitis, antistreptococcic and Gay's hyperimmune rabbit.

D **Vaccines.** Levaditi's herpes recovered rabbit brain vaccine, Rosenow's vaccine for encephalitis and Stewart's Pfeiffer vaccine.

II **Methods modifying the course of the disease** by reducing intracranial pressure through hypertonic dextrose or iodide solutions intravenously and lumbar puncture.

III **Drugs controlling symptoms.** Scopolamine, stramonium and atropine group; sedatives (barbitu-

rates), ephedrine, bulbo-capnine, endocrine therapy—all of which are merely of temporary value

IV Methods for building up the general resistance, health and morale general hygiene; removal of foci of infection; tonics such as iron, arsenic and strychnine; physical therapy, occupational therapy and psychotherapy.

The study brings out a preliminary report of treatment in 370 patients by different agents as follows: (a) Levaditi's rabbit brain vaccine, improvement in 48 per cent, (b) Gay's hyperimmune rabbit brain vaccine, improvement in 48 per cent, (c) normal rabbit brain vaccine, improvement in 17 per cent, (d) streptococcus (Gay's control hemolytic streptococcus vaccine), improvement in 16 per cent; (e) Rosenow's vaccine, improvement in 32 per cent

The authors draw no conclusions from these comparisons of method, since it is well established that patients often-times improve without treatment of any kind. A long period of time must necessarily elapse before a proper evaluation can be made

ENDOCRINE GLANDS, INTERRELATIONSHIP OF.—The relation of the *hypophysis* and *ovaries* to experimentally-induced uterine bleeding in monkeys has been studied by S. Saiki (A J Physiol 100 8 (Mar) 1932), who found that menstruation-like bleeding from the uterus was caused by the injection into immature monkeys of an extract of pituitary gland (11 positive cases in 12). Intervals between the last injection and the external bleeding were from 4 to 9 days and the duration of the external bleeding was from 5 to 7 days. Castrated monkeys did not bleed microscopically or macroscopically

during or after the injection of the anterior lobe extract

The ovaries of the monkeys in which bleeding was produced by the treatment showed no ripe follicles or corpora lutea, but there was some difference in the ovaries, as shown by experiments in which the follicles were larger in the ovaries removed after the injections than in the control ovaries. The uteri from the positive cases showed bleeding from an interval stage of the endometrium

Bleeding which normally follows treatment with hypophysis extract was postponed by injections of follicular hormone

From his experiments, Saiki assumes that menstruation-like bleeding results from an alteration of the endometrium which occurs when the effect of follicular hormone is removed

As to the interrelationship of *estrin* and *corpus luteum*, W. M. Allen (Am J Physiol 100 650 (May) 1932) summarized the following points regarding the functions of the corpus luteum

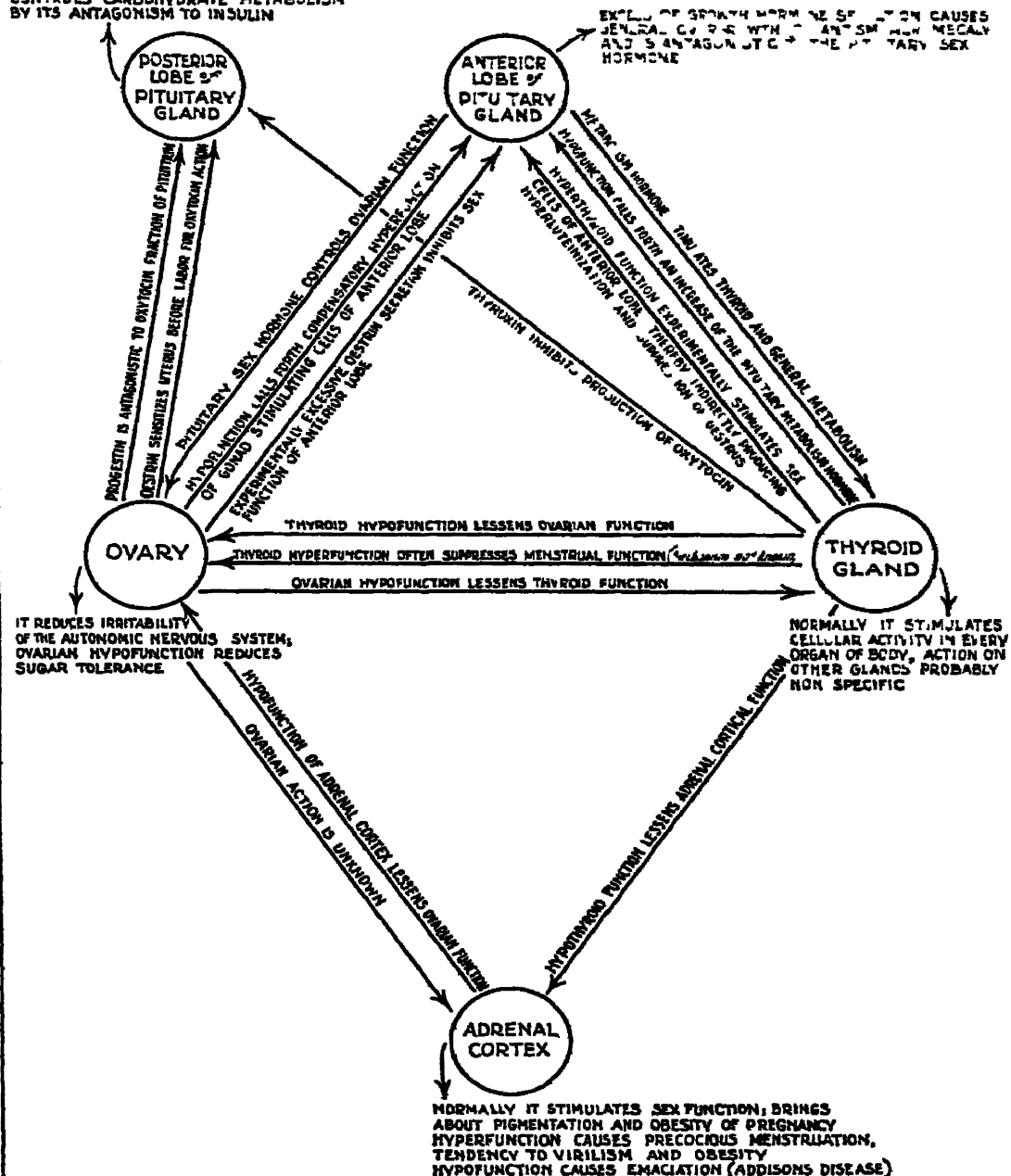
1 Active progestin-containing extracts lose their ability to produce gestational proliferation in the castrated rabbit's uterus when they are given simultaneously with sufficient amounts of estrin, 675 rat units of estrin inhibit completely 3 rabbit units of progestin

2 Large doses of estrin (1000 rat units) given during the first 5 days after mating prevent the development of proliferation, but do not prevent the development of normal appearing corpora lutea

3 Large doses of estrin (1000 rat units) given during the second 5 days after mating cause extensive degeneration with sloughing of endometrium, but produce no demonstrable changes in

SCHEMATIC REPRESENTATION OF ENDOCRINE INTER-RELATIONSHIPS (PITUITARY - OVARY - THYROID - ADRENAL CORTEX)

STIMULATES UTERINE CONTRACTIONS AND "ERECTALIS"
ELEVATES BLOOD PRESSURE CONTROLS FAT METABOLISM
THROUGH STIMULATION OF TUBER CINEREUM
CONTROLS CARBOHYDRATE METABOLISM
BY ITS ANTAGONISM TO INSULIN



C.M. 18

The chart portrays diagrammatically a summary of the different functions and relations of the more important endocrine glands (From C Mazer and L Goldstein "Clinical Endocrinology of the Female" W B Saunders Co, Philadelphia, 1932)

the corpora lutea. The placentæ start to form but are very abnormal.

ENDOMETRIOSIS. — PATHOGENESIS.—The pathologic anatomy and clinical aspects of endometriosis of the uterine tube are discussed by L. Seitz (Zentralb f Gynak 56 1746 (July 16) 1932). He calls attention to the fact that if endometrioid tissue is present in the uterine tube, tubal menstruation is the result. In course of time this leads to closure of the abdominal end of the tube. If during every period only small amounts of blood are excreted, a chocolate or tar tube develops gradually. If profuse bleeding sets in after closure of the tube, acute formation of a hematosalpinx, with more or less fulminant manifestations, is the result. These severe symptoms are similar to those observed in tubal rupture, in acute adnexitis, or in torsion of the pedicle. If the quantity of cycle hormones is small and the functional transformation of the glandular epithelium is slight, as the author observed in a patient with oligomenorrhea and with increasing obesity, it is possible that, instead of the pure blood, there is a serous or serosanguineous secretion. In this event, not a chocolate or tar tube is formed, but rather a hydrohematosalpinx. The same applies to heterotopic cysts of the ovaries. Not only tar and chocolate cysts of the ovary, but also cysts with serosanguineous contents may be caused by heterotopic proliferations. Yet in these serosanguineous accumulations, just as in the typical chocolate cysts or tubes, the characteristic clinical symptoms are the gradually increasing dysmenorrheal disorders and signs of peritoneal irritation.

In discussing the genesis of heterotopias of the mucous membrane L.

Seitz (Arch f Gynak 149 529 (June 24) 1932) calls attention to the fact that they frequently concur with uterine myomas and that both these conditions are influenced by the ovarian hormones. He believes that the diagnosis of endometriosis is justified (1) when the histologic examination reveals the typical structure of the endometrium, (2) when the cells show cyclic changes, or if in the case of pregnancy, they show a decidual reaction, and (3) when typical menstrual hemorrhages are noticeable, for instance, from the endometrioses of the umbilicus or from the heterotopias that have perforated into the intestine or the bladder. Should the histologic examination fail to reveal the typical aspects of endometriosis, the diagnosis endometriosis is nevertheless justified when the blood indicates that cyclic hemorrhages have taken place, as in the case of chocolate cyst of the ovary, or when dysmenorrheal pains or other disorders which occur at the time of menstruation indicate a reaction of the tissue to the stimulation of the ovarian hormones.

The author also points out that hematosalpinx and chocolate cysts originating in endometrioid foci may be the cause of an erroneous diagnosis of tubal pregnancy. He further discusses the character of endometrioses, *viz*, whether they are always benign or whether they may undergo malignant degeneration, and after giving a tabular report on the localization of the 65 cases personally observed, he gives a clinical classification. He differentiates 3 types (1) endometriosis interna, (2) retrocervical endometriosis with infiltration of the posterior uterine ligaments, and (3) endometriosis of the ovaries (chocolate cysts), of the tubes and of the pelvipерitoneum.

TREATMENT.—The treatments are evaluated, *viz.* **x-ray therapy** and **surgical methods**. Because endometriosis can be cured without exclusion of the ovarian function, the author concludes that, although the ovarian function is necessary for the development of endometriosis, it is not its cause. For young women he considers surgical treatment better than castration by x-ray therapy. He warns that patients with endometriosis require observation for about 5 years following the treatment, just as do patients with carcinoma.

ENDOSCOPY.—Every year it has been observed that there has been an increase in the number of contributions to the literature of peroral endoscopy. Whereas formerly reports of cases of foreign body came from relatively few bronchoscopic clinics, now reports are observed in practically every state medical journal. This is indicative of a more general recognition of these cases, as well as an increase in the number of specialists who can successfully care for them. Bronchoscopy and esophagoscopy are now commonly accepted procedures in diagnosis and treatment. The literature dealing with these procedures, consisting in great part of reports on their use and the results secured, is becoming voluminous.

APPLIED TO AIR PASSAGES.

—V. E. Negus (Lancet 2 169 (July 23) 1932) presents examples from 95 patients in an attempt to illustrate the great value of endoscopic methods applied to the air passages. At least 28 patients subject to most dangerous complaints were cured, while none were harmed. Of the remainder, 26 were improved, some to a marked extent, 11 were unchanged. In 21 a diagnosis was called for and made. Six patients died

in spite of treatment. Of 72 patients for whom bronchoscopy was used as a means of treatment, and not merely for diagnosis, a total of 28 cured and 26 improved was gratifying considering the variety and unpromising nature of many of the conditions.

ESOPHAGEAL STENOSIS, CONGENITAL.—In congenital atresia of the esophagus it is known that the lower esophagus not infrequently communicates with the trachea or a bronchus. When the x-rays show the stomach to be distended with air, this developmental anomaly may reasonably be suspected. In such cases, feeding through a gastrostomy rather tends to hasten death from pneumonia because of the regurgitation of food into the lungs. This particular anomaly might be proved definitely by the injection of iodized poppy-seed oil, 40 per cent, into the trachea. In such cases the performance of a gastrostomy is not indicated. It is conceivable that feeding might be given through a jejunostomy, without regurgitation, until the infant could be gotten into shape for an attempt to close the fistula. Congenital atresia of the esophagus with tracheoesophageal fistula is reviewed by A. H. Rosenthal (Arch. Path. 12 756 (Nov) 1931). Including the author's 8 cases, 255 cases of congenital esophageal stricture have been reported. In 205 of these cases a tracheoesophageal fistula was also present. Clinically, these infants are well-developed at birth. When an attempt is made to feed them, they take a few swallows readily, but then they cease to breathe, become cyanotic and regurgitate a frothy discharge through the nose and mouth. After appearing almost lifeless for a short time, they recover, to go through the same performance again if another attempt is made to

feed them. If a catheter is passed into the esophagus, it meets an obstruction about 10 cm from the alveolar ridge. The author describes the gross anatomic structure in 8 cases and the microscopic structure in 4 of these. He also discusses the various theories that have been advanced to explain the anomaly, and discards all except one presented by George L. Streeter, *viz*, that of an early fundamental deficiency in the entodermal cells which give rise to the esophagus.

A. Brown Kelly (Monatschr f Ohrenh 65-1369 (Nov) 1931) believes that congenital shortness of the esophagus would perhaps not prove to be as rare as is commonly believed, if the symptoms were better known. In describing the *symptomatology*, he mentions as the most outstanding symptom the so-called vomiting, which is largely due to regurgitation. The largest portion of the article treats of the methods of examination that are necessary for the recognition, especially of roentgenoscopy and of endoscopic examination. In regard to the *treatment*, the author states that neither a congenitally short esophagus nor the resulting thoracic stomach necessitates surgical intervention. The *cardiospasm*, however, should be treated by dilation of the cardia.

BRONCHOSCOPY IN CHILDREN.—This is discussed by A. Bloch and A. Soulas (Bull Soc de pédiat de Paris 29. 398 (July) 1931), who review the *indications* for its use in children, *e g*, *foreign bodies in the bronchi, bronchial obstruction due to papillomata, congenital stenosis, inflammatory stenosis and bronchopulmonary suppuration*. The narrowness of the epiglottic opening is discussed, and the question of the advisability of performing tracheotomy and then inferior bronchoscopy, as op-

posed to "superior" bronchoscopy, which has in some instances been followed by subglottic edema, is mentioned. The latter condition need hardly occur if an instrument of the proper size for each particular case is used, and the bronchoscopist's technic is good. The conclusion reached is that peroral bronchoscopy without any anesthesia, general or local, in the child, is not a dangerous procedure in proper hands, and should be used whenever it is indicated.

It is important to remember that esophagoscopy is much more difficult and dangerous to perform than bronchoscopy, especially in infants and the aged, according to J. W. Miller (Arch Otolaryng 16 188 (Aug) 1932), and while not proposing anything new, he brings out important facts.

1 Local anesthesia is used for adults, neither general nor local anesthesia is used for children, with few exceptions.

2 Patients with upper dental plates have difficulty in detecting foreign bodies, especially bones, etc, and easily swallow them.

3 Occasionally some patients give classic signs and symptoms of a foreign body in the air passages which may be due to other causes, such as subglottic edema.

4 In perforations of the cervical esophagus, when it is certain that a perforation exists, it is advisable to do a prophylactic mediastinotomy through the neck (Marschek's method). Perforations lower down in the esophagus should be enlarged, and the patient should be fed *via* a rubber tube inserted through the nose, thus draining the mediastinum (Seiffert's method). The use of the old-fashioned coin catcher should be condemned.

5 At times, a foreign body is dislodged from the constricted area by forceps or a scope and is pushed downward into the stomach.

DIAGNOSIS OF BRONCHOSTENOSIS.—Lord (J. Thoracic Surg 1 573 (Aug) 1932) states that the perfection of bronchoscopic methods by

Killian and Gottstein in Germany, and by Jackson in America, has gone far toward surmounting the difficulties connected with the diagnosis of bronchostenosis. He concludes that progress in the clinical recognition of bronchostenosis is due to an understanding of its consequences and their mode of production and to advances in methods of investigation. Evidence of great value in diagnosis may be obtained from the history, physical signs and x-ray examination; none of the 3 can be safely neglected. Physical signs are of chief importance in obstruction atelectasis and x-ray examination in obstruction emphysema.

FOREIGN BODIES.—*Pins.*—

Pins as foreign bodies are not new, but C Jackson and C L Jackson (*Arch Otolaryng* 15 860 (June) 1932), with a presentation of 42 observed cases of pins at the periphery of the lung, show that such patients constitute a class distinct from the same foreign body in the larger bronchi. From a record of their clinic, they have dealt with 372 pins in the air and food passages, 113 having been found in the bronchi, and it is in the latter group that 42 were found in the relatively minute bronchi. They were able to conclude from their studies that

1 Pins at the periphery of the lung are practically always lodged head downward. This may be due to the catching of the point and the tumbling over of the head end, and partly to the fact that the head end is the heavier.

2 The primary cause of pins in the lung is carelessness in putting pins in the mouth. There are, of course, numerous secondary etiologic factors. The cause of the pin reaching the periphery is a pawl and ratchet-like action of the pin, the head is free to move downward during inspiratory elongation of the bronchi, and the point catches and resists upward movement during the bronchial

shortening of expiration and cough. The limit of downward travel is the smallest bronchus that the head of the pin can enter.

3 After the initial choking, gagging and coughing, there is in the case of pins at the periphery of the lung, a symptomless interval of a number of months. Sooner or later, however, suppurative changes, with productive cough and progressively increasing impairment of health, supervene, and a fatal ending may eventually occur if the pin is not removed. They feel that experience offers a 99 per cent chance for the removal of such foreign bodies.

4 All pins at the periphery of the middle and lower lobes and descending branches of the upper lobes can be removed through the mouth by peroral costophrenic bronchoscopy. The ascending branches of the upper lobes present great difficulties, but fortunately their invasion by pins is exceedingly rare.

Postoperative Care.—The postoperative care of foreign body in the lung in infants and young children is discussed by M. F. Arbuckle (*South M J* 25 456 (May) 1932). Young children are more liable than older children to have complications, such as shock, cyanosis, dyspnea and sepsis. In robust infants with no complicating condition, ordinary examination and routine bronchoscopy are indicated. In the case of an infant who enters the hospital in a state of shock, with cyanosis and dyspnea, immediate supportive treatment is imperative. A tracheotomy set should be available, and the surgeon should be in constant attendance pending the completion of arrangements for bronchoscopy. A routine bronchoscopy may then be done with safety.

INTRATHORACIC DISEASE.

—**Diagnosis**—L. S. T. Burrell (*Brit J Radiol* 5. 193 (Mar) 1932) reviews the various methods of administering *iodized poppyseed oil* 40 per cent in the diagnosis of intrathoracic disease. There are disadvantages in the cricothyroid method. If it is not given

properly the material, instead of being injected into the trachea, goes into the surrounding tissues and may lead to cellulitis and a considerable amount of pain, if not actual danger. Introduction by the nasal route is simple, but there is a possibility of laryngeal spasm. The usual method of introduction, at present, is through the cords with a laryngeal syringe. The most obvious indication for the use of the oil is bronchiectasis, in which condition it is a guide to treatment, which depends largely on whether the disease is unilateral or bilateral. The author has frequently had a patient with obvious signs of bronchiectasis in one lung, and only by the use of the oil has he discovered that there was considerable bronchiectatic dilatation on the other side. Before urging a surgical operation of any magnitude, therefore, it is essential to have an x-ray examination after using the oil. Again, it is difficult or impossible to determine clinically the extent of the bronchiectasis, and treatment depends largely on extent. If bronchiectasis is confined to the *extreme lower lobe of the lung*, it is possible to have that lobe excised. The author has been most impressed by the results of operation. It was not until iodized poppy-seed oil, 40 per cent, was introduced that it has been recognized that a certain proportion of cases of unexplained hemoptysis were really bronchiectasis. Formerly, such patients would be sent to a sanatorium, but now it is possible to clinch the diagnosis in many cases. Every case of unexplained hemoptysis should be examined by x-rays after injection of the oil.

TUMOR.—*Diagnosis.*—*Primary malignant tumors* of the lower third of the trachea are extremely rare. Few cases are recognized until so far ad-

vanced that treatment is of little, if any, avail. The symptom complex of intermittent dyspnea, cough, perhaps occasional hemoptysis, apparent good health and absence of obvious intrathoracic signs suggests tumor in the tracheobronchial tree. In such cases, endoscopy is most certainly indicated. A review of the literature up to July 1, 1931, was made by F. E. Gilfoy (Arch Otolaryng 16:182 (July) 1932) who presents a case of primary malignant tumor of the lower third of the trachea in addition to the 24 cases already reported. The results obtained in the treatment of such a case by the use of intratracheal electrofulguration, supplemented by deep x-ray therapy, according to Gilfoy, are most encouraging and merit further trial.

Benign tumors of the trachea and bronchi, with especial reference to tumor-like formations of inflammatory origin, were well presented by C. Jackson and C. L. Jackson (J. A. M. A. 99:1747 (Nov. 19) 1932). These growths, while being benign histologically, may be mechanically malignant and may be summarized as follows:

1. Benign growths of the tracheobronchial tree encountered bronchoscopically are as follows: angioma, hematoma, adenoma, myoma, myxoma, papilloma, fibroma, fibrolipoma, edematous polyp, lymphoma, lymphangioma, lymphadenoma, lipoma, ecchondroma, osteoma, chondrosteoma, tracheopathia osteoplastica, teratoma, retention cyst, amyloid tumor, aberrant thyroid, specific granuloma, (a) tuberculous, (b) syphilitic, and (c) mycotic, nonspecific granuloma, granulation tissue and inflammatory hyperplasia. Many of these are of inflammatory origin and would not be classed histologically as true neoplasms.

2. The most common of all growths encountered bronchoscopically is a tumor-like formation of inflammatory hyperplasia. Histologically, the lesion is not simply a chronic mucosal bronchitis, though, of course, the latter condition may coexist adjacently.

3 The borderline between benign true neoplasms and inflammatory hyperplasia is often indistinct histologically. Clinically, the seriousness of the lesion depends more on the degree and the region of the obstruction it causes than on the histology or the growth. A papilloma at the bifurcation may kill the patient by asphyxia, and a tumor-like, inflammatory hyperplasia in a bronchus may produce, in the tributary portion of the lung, atelectasis, drowned lung, pulmonary abscess, bronchiectasis and empyema, or all of these in succession. A recovery from these secondary conditions follows bronchoscopic removal of the growth, if the diagnosis is not made too late.

4 The only way an early diagnosis of endobronchial growth can be made positively is by bronchoscopy.

5 The only way to determine on the living patient that an endobronchial growth is benign is by histologic examination of a bronchoscopically removed specimen.

6 Bronchoscopic removal of an endobronchial growth is a simple and safe procedure in trained hands.

7 Removal of the obstructive growth re-establishes ventilation and drainage, and thereby the defensive power of the lung is restored.

ESOPHAGOSPASM in children is discussed by H. Bruhl (Ztschr f Laryng, Rhin (teil 1 Folia otolaryng) 21.1 (June) 1931), who first gives several case histories of this condition in children. That the disturbance was really localized in the esophagus is proved by the typical sign, *vis*, that the *food is regurgitated without nausea, immediately after swallowing*. The process is more of an outflowing than an actual gastric vomiting. It is usually combined with irritative coughing and a feeling of oppression. The vomitus does not yet show the influence of the gastric hydrochloric acid. In the cases under the author's observation the x-ray examination always corroborated the clinical diagnosis, and the esophageal obstruction could be exactly localized.

The onset of the disturbance disproves the congenital character, esophageal neoplasms are almost unknown during childhood, and the obstruction of the esophagus by mediastinal processes can be excluded on the basis of the history, the clinical behavior and the x-ray picture. More difficult is the differentiation between organic stenosis and spasm. In the 2 last cases described by the author the mode of onset, the sudden changes in the clinical behavior and the effectiveness of pedagogic measures indicated a functional disturbance. In the first case reported, in which the esophagospasm developed after the drinking of a corrosive fluid there was a slight cicatricial stenosis for, in contradistinction to the 2 first cases, the introduced sound encountered a certain surmountable obstacle. The further course was similar to that in the other 2 cases.

Before discussing the pathogenetic mechanism of spastic esophageal stenosis, the author reviews the anatomic structure of the esophagus, its innervation, its peristalsis and the complicated reflex process of swallowing, and he points out that the normal esophageal action consists of a complicated bulbar reflex, which is similar to the simple spinal reflex arcs. Changes in the peripheral organ, as, for instance, corrosion of the esophagus, may cause a reflex increase. The author further discusses the esophagospasm that develops as the result of an irritation of the peripheral neuromuscular synapses, as in cases of tetany, following attacks of pertussis and in chorea. All these cases of esophagospasm are similar in pathogenesis and are of the *sensomotor type*. In another form of esophagospasm *psychic factors* are involved. Because of the connection of the peripheral reflex disturbance with central psychic processes

this group is designated as *correlative esophagospasm*, and has the aspects of a traumatic neurosis. In the third, purely *psychogenic form*, the hypobulic mechanism is involved.

In discussing the *therapy* of esophagospasm, the author emphasizes the significance of *psychotherapy*, especially for neurotic and psychogenic forms. The main object should be to treat the child and not the esophagus. It is usually of great help to bring the child into different surroundings and to employ "physiologic bougienage," the food itself serving as bougie. The esophagus is trained by gradually increasing the amounts and the variety of foods. In some cases, of course, this method fails, and surgical treatment becomes necessary.

Sudhues (Arch f Kinderh 96 65 (Apr 8) 1932) reviews the literature on esophageal spasm in children and then reports 4 new cases, in 2 of which there was a constitutional inferiority. She is convinced that careful examination, particularly with x-rays, will reveal that a spasm of the esophagus is frequently the cause of vomiting. She differentiates between *primary* and *secondary* spasms. The *secondary spasms* may occur in normal children following an injury or an inflammation of the esophagus. However, the *primary spasm* is probably due to a congenital inferiority of the sympathetic nervous system, *viz*, to a disturbance in the vagus or in the intramuscular plexus of the esophagus. The primary spasm is in nearly all cases in the lower third of the esophagus. A satisfactory explanation for this localization has not been found as yet. It has also been observed that the primary spasms are more frequent in boys than in girls. A group of cardiospasmis with dilatation of the esophagus that occurs

during the first year of life is explained as resulting from the abolition of the opening reflex of the cardia, which, in turn, is due to an injury of the vagus. This theory of pathogenesis is based on studies by Ylppo, Tamiya and Rieder.

ENURESIS. — DEFINITION. —

According to M F Campbell (J Urol 28 255, 1932), enuresis is the unintentional or involuntary nocturnal or diurnal urination in the absence of demonstrable uropathy.

ETIOLOGY.—*Predisposing Cause.*

—*Age*—Enuresis, according to O B Markey (Arch Pediat 49 269 (May) 1932) "is a physiological condition until a child reaches a certain age." It must be remembered that voluntary elimination is an acquired function and that conscious control of the sphincter action does not develop until some time after birth. Complete anatomical development of the external sphincter is not present at birth. The author states that a pediatrician succeeded in training his twin infants to bladder control by the time they were 4 months of age. For the sake of sound practice, the author states that 18 months should be considered the maximum age for diurnal control and 2 years for nocturnal. According to Campbell (*loc cit*), normally, bladder control should be established by the age of 2½ years and with rare exceptions children of this age should go all night without wetting.

Sex—Campbell could demonstrate no striking sex difference in the incidence of the condition in the male and female. In his series of cases, 118 were males and 131 were females.

Hereditary Traits—In 2 families, Campbell traced enuresis through 3 generations. In one of these there were 3 children, all bed wetters. Their father

wet the bed until his marriage night, his mother continued to wet the bed even after marriage

Antecedent Disease—Rarely, antecedent disease is of etiologic importance, peripheral neuritis of the vesical nerve supply follows some infectious disease such as scarlet fever and diphtheria

Specific Causes.—Campbell considers enuresis a symptom and not a disease entity. Consequently, a great variety of causes for the condition exist. These causes may be classified either as *organic* or *functional*, although Markey (*loc cit*) points out that practically it is very difficult and biologically unwise to sharply separate the former from the latter

(a) *FUNCTIONAL CAUSES*—*Delayed Training*—If actual training is started too late, according to Markey, the child not only has to develop the good habit of control of elimination, but also to overcome the bad habit of lack of control

Emotional Factor—When an individual becomes conscious of any part of his body as a source of difficulty, his views early become distorted, because they are based on feeling and not on reason. Many of the children try to control their difficulty voluntarily, but their control is only weak, fleeting and temporary. Some children get the idea quite early that their trouble has an organic basis. This results in an attitude which acts as a license for a continuation of the habit. The child often feels justified because he knows he will overcome the habit in some magic way when he reaches a certain age, usually puberty. Another child feels justified because he has been told he has "weak kidneys."

Stigmatizing the child, as by segregating him or shaming him in front of his

group, or by in any way making his weakness common property, is a potent cause for mental conflict

Enuresis represents a powerful means of attracting attention which some children learn to make use of. There may be some relationship between enuresis and the usual form of tic or habit spasm

(b) *ORGANIC FACTORS*—In a series of 249 children, 4 years of age and older, in whom clinicians had diagnosed enuresis and in whom medical physio- or psychotherapy had failed, complete urological examinations were carried out. In 60 per cent of these children a definite organic basis for the urinary symptoms was found

Residuum—Residual urine was observed in 16 per cent of Campbell's (*loc cit*) patients. With this residual urine the bladder neck is continually irritated and it requires less bladder filling to cause the conscious desire to void. With infravesical obstruction and residuum, upper tract back-pressure injury regularly occurs. In juveniles, residual urine is most commonly due to congenital obstruction at the bladder neck or urethra, but may be occasioned by neuromuscular disease, the so-called "cord bladder"

Myogenic and Neurogenic Balance—By means of cystometric studies, Campbell observed that one-half of the cases were normal, one-fourth were hypotonic (sympathetic imbalance) and one-fourth were hypotonic (parasympathetic imbalance). In many of the latter, however, hyperirritability due to urinary infection existed

Cystoscopic Findings—These findings in Campbell's cases included practically every known lesion of the urinary tract; *stone, tuberculosis*, all gradations of *cystitis, prostatitis, verumontani-*

tis, upper urinary infections, neuromuscular disease of the bladder outlet, congenital contraction of the bladder neck, posterior urethral valves, urethral stricture, and many others

In girls, *urethritrigonitis*, involving the posterior urethra and anterior trigone, frequently occurred, cystoscopically, the lesion closely resembled that of the so-called irritable bladder of women

In many boys, changes in the verumontanum and prostatic urethral mucosa afforded the same picture as that commonly seen with excessive masturbation in the adult.

TREATMENT.—The *first* principle, according to Markey (*loc cit*), is to eliminate the organic factor, either as a local or general manifestation. The *second*, is to consider each child as an individual personality requiring individual analysis and treatment because he is suffering from a mental conflict peculiar to himself. *Thirdly*, it must be remembered that there are good and bad methods and that the bad ones, though they may succeed occasionally in curing the enuresis, often do serious damage to a child's emotions. Treatment methods must be psychologically harmless, regardless of the results

The part the psychiatrist plays directly in treatment of these cases is rarely any different from the part any other physician or worker associated with the child should play. The approach must always be unemotional and cover a thorough investigation into the whole field of personality

Stigmatization is about the worst method of treatment. Nicknames, joshing, scolding and expressions of lack of faith in the child are examples. Emotional handling tends, in a vicious circle, to aggravate the conflict and strengthen

the child's fear of continuing the enuresis

Placebo medication works only in selected cases because the child is suggestible enough to have faith in the medicine or the doctor, or both, and to believe that he has been cured of an organic ailment when the enuresis stops. Other methods of positive suggestion may be used. The child may be repeatedly encouraged in the belief that he can and will stop wetting the bed. In some instances the chart method is successful. The child keeps his own chart and records *only* the dry nights

When a child feels that his enuresis has a definite organic basis in the face of a negative examination, his feelings should not be minimized. The whole problem should be carefully discussed with him in a psychiatric manner. Occasionally the child reacts to positive autosuggestion. Before bed-time the child tells himself that he will get up should he desire to eliminate, or that he will simply not have such a desire during the night

The most important step in the direction of complete bladder control is the need for the child's being thoroughly conscious of voiding at all times. It is important that the child be thoroughly awakened at such times and that he be more or less forced to walk to the bathroom

Group treatment has an important place in an institution when enuresis has become a source of shame. Such children should not be isolated in one ward, but should be scattered among the nonenuretics

The belief that enuresis disappears when puberty is reached is no more than a support acting to prolong the condition. Enuresis probably stops at that time because the individual actually ex-

pects it to stop. If the child were put in the same frame of mind of expecting to stop it long before this time, the chances for success would be equally good.

According to Campbell (*loc cit*), when enuresis persists longer than 2 to 3 months despite medical physio- or psychotherapy, a urologic examination is advisable. The treatment is based upon the urologic diagnosis, sometimes radical surgery is required. Through urologic therapeutic measures further urinary tract destruction frequently may be prevented, after the underlying disease is cured and, incidentally, the enuresis ceases when there is no demonstrable uropathology, one may rest assured that normal vesical control will ultimately be established.

N F Miller (J A M A 98 628 (Feb 20) 1932) reports a case of a 5-year-old-girl with urinary incontinence persisting after an operation correcting the congenital absence of the urethra. The urethra was intact but toneless. A split pelvis and spina bifida occulta were present. The child was successfully treated by means of a modified Goebell-Stockel muscle transplant operation.

EPHEDRINE. — PHYSIOLOGICAL EFFECTS—In a study of the comparison of the chronic effect of ephedrine and epinephrine on the nasal mucosa of rabbits, N Fox (Arch Otolaryng 13 73 (Jan) 1931) used a 1:50 solution of ephedrine hydrochloride and a 1:1000 solution of epinephrine chloride over a period of 3 months. Ten healthy rabbits were selected for each set of experiments and daily observations were made of activity, nasal discharge, if any, and the weight of the animals. A third set of 10 animals to

serve as controls, were sprayed simultaneously with a physiologic solution of sodium chloride. At the end of the 3 months' period the septal and turbinal tissues were prepared for histologic studies. The animals in which the ephedrine hydrochloride solution was employed showed little, if any, injury to the tissue. In the rabbits sprayed with epinephrine solution, sections taken from the maxilloturbinate tissue exhibited evidence of considerable antemortem denudation and there was more infiltration of the mucous membrane than was noted in the other animals, with some intraepithelial abscesses present. Some of the sections from this group showed a great deal of free hemorrhage into the substrata propria. The presence of newly regenerated tissue noted in all of the sections was taken as evidence of the chronicity of this process.

In another experimental study, Fox (*Ibid* 13 255 (Feb) 1931) made a comparison of the after-effects of these two solutions on the mucosa of the nasal septum and concluded that ephedrine hydrochloride, when sprayed on the nasal mucosa, leaves the blood-vessels unchanged after 4 hours have elapsed. A solution of 1:1000 epinephrine chloride, however, after 4 hours causes the vessels, which at first are constricted, to dilate and allow blood to escape into the perivascular bed. The author states that, on the basis of these experiments, it is difficult to say whether the changes noted with epinephrine are due to some difference in the physiology of the sympathetic innervation or follow some change in the musculature of the arterioles, capillaries or vessels. It seems rather most likely that epinephrine exerts some direct injury to the vessel walls.

R M Balyeat and H J Rinkel (J A M A 98 1545 (Apr 30) 1932) have noted from personal observations and from a review of the literature, the frequent occurrence of urinary retention due to the use of ephedrine. As an explanation of the mechanism of this untoward bladder symptom, the authors offer the following according to F M Pottenger ("Symptoms of Visceral Disease," 3d Ed, C V Mosby Co, St Louis, 1925) and A Kuntz ("The Autonomic Nervous System," Lea and Febiger, Philadelphia, 1929), the action of the parasympathetic nerve on the musculature of the bladder wall is that of activation, while that of the sympathetic nerve fiber is that of inhibition. The enervation of the muscles of the bladder sphincter is just opposite to that of muscles of the bladder wall. According to K K Chen and C F Schmidt (Medicine 9 1 (Feb) 1930), the action of ephedrine is that of stimulation of the sympathetic fiber of the vegetative nervous system. The action of ephedrine differing somewhat from the evanescent nature of epinephrine, is prolonged, therefore, its continuous use in large doses would have a tendency to relax the bladder wall and contract the bladder sphincter, which clinically is found actually to happen, thereby causing the lack of desire to pass urine, or urinary retention.

X-ray studies were made of a series of cases by W W Fray (Am J M Sc 182 387 (Sept) 1931) to determine the effect of ephedrine on the tone, peristalsis and spasm of the stomach, and to compare its effects in stomachs with and without local disease, as well as to compare its objective effects with atropine. The cases were selected during the course of routine gastrointestinal examinations, usually because of the pres-

ence of spasm, though in many instances spasm was absent, and the drug was administered to determine the effect on peristalsis and tone. A total of 97 cases were studied, of which 58 were given ephedrine orally and 39 received atropine subcutaneously. The repeat examinations with ephedrine or atropine were always made on the same day and within $\frac{1}{2}$ hour after the first examination. This was considered by the author as a necessary prerequisite, since normal stomachs vary markedly from day to day in tone and peristalsis and in the presence or absence of spasm.

Out of the total of 58 cases studied in which ephedrine was administered, 32 cases were found to be free of local disease. Thirteen of these were studied with particular attention to peristalsis and tone and 21, because of the presence of spasm, either at the pylorus or at a distance from the pylorus affecting the pars media. Of the cases with organic disease, the chief intrinsic lesion was duodenal ulcer (14 cases), a few cases of extrinsic lesions, such as periduodenal adhesions (7 cases), carcinoma of gall-bladder (1 case), and carcinoma of the esophagus (1 case) were included. Of the 39 cases in which the effects of atropine were studied, 20 showed no local lesion.

As a result of this study, Fray concluded that from the x-ray standpoint, ephedrine accomplishes much the same objective result that is seen after atropinization. Peristalsis and tone became decreased in the vast majority of individuals with normal stomachs after either ephedrinization or atropinization, while these effects occurred much less frequently when a local lesion was present. While ephedrine was as successful as atropine in this series in relaxing spasm, the author calls particular atten-

tion to the finding that both of the drugs failed to relax spasm in one-half or more of the cases studied. No case of cardiospasm appeared benefited by either drug, and in cases of pylorospasm it was a common finding to note only partial relaxation. It was evident that neither of these two drugs should be accepted as a diagnostic agent in the differentiation of an intrinsic lesion from an extrinsic one with reflex spasm, although both drugs effected a relaxation of spasm in the presence of local disease.

EPIDERMOLYSIS BULLOSA.

—TREATMENT—Favorable results are reported by J B Ludy, C M DeValin and P H Hart-Drant (M Clin North America 16 169 (July) 1932) in the treatment of 3 cases of epidermolysis bullosa with large doses of viosterol. Daily doses of viosterol, ranging from 10 to 30 cc, were given for 5 days out of each week and withheld for 2 days. This period of rest prevents the deposit of calcium in the soft tissues. Daily cold baths were also given. In the cases cited the appearance of blisters was definitely inhibited.

EPILEPSY.—PATHOLOGY.—

H Costeff (Am J Psychol 11 747 (Jan) 1932) reports that more than 50 per cent of 114 epileptics examined presented *engorgement of the retinal veins*. He concludes that this passive hyperemia in the fundus tends to prove the existence of intracranial hypertension in epileptics, as suggested by Temple Fay, Kalt and Claude.

TREATMENT.—Anatomical evidence of disturbed venous drainage of the brain is presented by G W Swift (Surg Gynec and Obst 54 566 (Mar) 1932) and he points out the im-

portance of anomalies which occur in a certain group of epileptics where the transverse sinus may be absent on one side or actually associated with compensatory enlargement of the occipital sinus.

Swift points out the possibility of developmental anomalies secondary to the embryonic development of the venous plan of the transverse and primary head veins which may give rise to these unrecognized anomalies. The author indicates important considerations secondary to disturbed water metabolism and cerebrospinal fluid circulation, as they may produce obliteration or mobilization of the transverse and sigmoid sinuses. He points out that a variation of the caliber of the sinus results in obstruction to cerebral and venous drainage and secondarily to cerebrospinal fluid circulation and absorption. Changes of intracranial pressure may thus be produced through a mechanical obliteration of the large venous sinuses secondary to their improper location and development.

Swift has devised an operative method for mobilization of the transverse sinuses so as to prevent the above described mechanism of occlusion and thus favor more constant and efficient cerebral drainage. The results have been attended by improvement in approximately one-third of the cases, with complete relief from convulsions in 10 per cent. The operative risk when carefully undertaken is concerned primarily with the possibility of postoperative hemorrhage. Two deaths occurred within the first 24 hours in a series of 65 cases. In this group, rather extensive suboccipital craniectomy was performed. In a more recent series of 12 selected cases, where the procedure necessitated the removal of the bone over the lateral

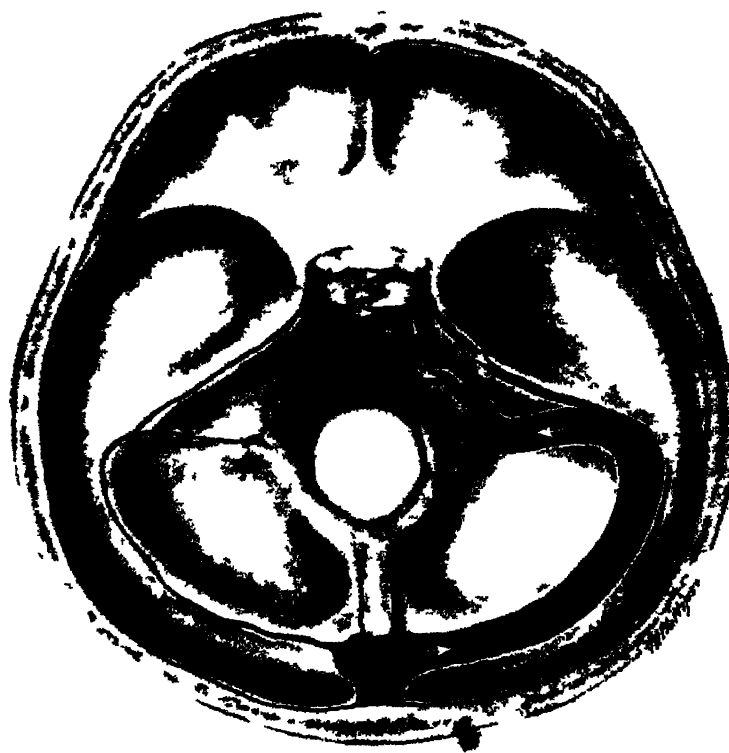


Fig 1—Asymmetrical development of the basilar sinuses Left transverse, rudimentary Left superior and inferior petrosals do not function (G W Swift Surg Gynec Obst)

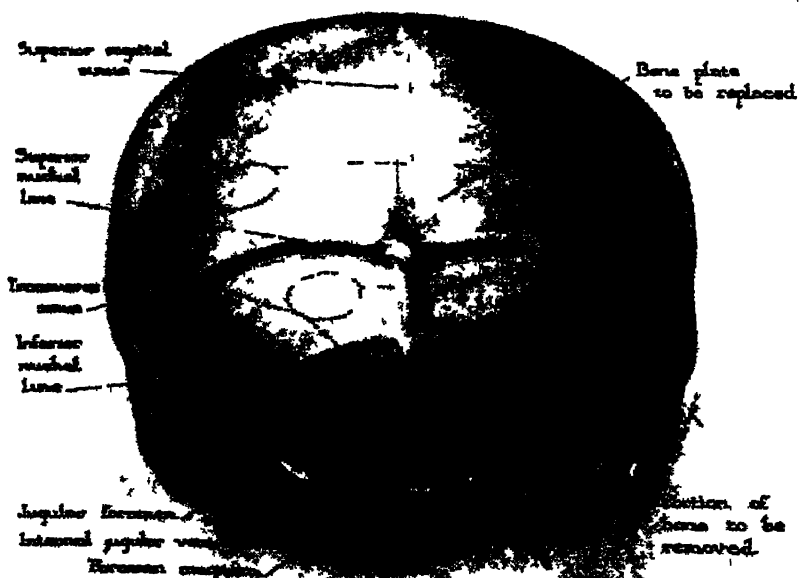


Fig 2—Posterior view of skull showing the operative area (G W Swift Surg Gynec Obst)

sinus and torcular, with replacement of the bone plate there has resulted marked improvement in approximately 80 per cent of the cases so operated without a mortality

The author concludes as follows

1 The periodic convulsive seizures associated with so-called idiopathic epilepsy begin with a gradual accumulation of cerebrospinal fluid over the cortex and in the cisterns of the brain, causing a constant irritation to the cortex, particularly to the motor areas

2 The blocking of the cerebrospinal fluid may be due to inflammatory conditions of the arachnoid or Pacchionian bodies, or be produced by pressure upon any of the venous channels from the superior longitudinal sinus to the heart itself

3 A general state of hydration is essential for the convulsive seizure in all instances

4 Anomalous development of the venous dural sinuses is an important factor in epilepsy. Of these sinuses, the transverse sinus is of the most importance

5 In those cases of anomalous development, it is possible by mobilization of the transverse sinus, to restore a sufficient venous return to prevent, under normal conditions, an accumulation of cerebrospinal fluid in the subarachnoid spaces

6 The only complication that may arise during the course of this operation is post-operative hemorrhage. This can be avoided by careful attention to all vessels at the time of operation

7 *Indications* for this operation are the presence of anomalous venous sinuses in true epileptics with otherwise normal physical condition

8 *Contraindications* for this operation are the presence of disturbances due to inflammatory conditions, resulting in obliteration of the openings into the superior longitudinal sinus (Pacchionian bodies). Localized accumulations of cerebrospinal fluid over the cortex are, of course, not benefited by this operation.

9 The results of this mobilization bring about a marked improvement in the mental condition of the patient, as well as a decrease to a large proportion of the *grand mal* attacks and, to a less degree, the *petit mal* attacks

10 The operation is applicable in only 20 per cent of cases

H Gray and L C McGee (Arch Neurol and Psychiat 28 357 (Aug) 1932) found that the average concentration of cholesterol in the blood of epileptics was significantly lower than that in the blood of normal persons and that the average in the feeble-minded was even lower than in epileptics. Their results are considered as confirmatory evidence of the efficacy of high fat diets in the treatment of epilepsy and the authors point out that the even lower cholesterol in feeble-minded patients indicates the possible utility of diets high in fat in institutions for the feeble-minded

ERGOSTEROL (IRRADIATED VIOSTEROL).—PHYSIOLOGICAL EFFECTS—W Bauer,

A Marble and D Claflin (J Clin Investigation 11 1 (Jan) 1932) describe experiments in which they noted that the administration of viosterol in small doses to normal individuals produced no constant changes in either the calcium or the phosphorus metabolism. The administration of viosterol in daily doses of 30 mg ($\frac{1}{2}$ grain) to normal individuals resulted in an immediate increase of the fecal calcium and phosphorus excretion, while the urinary calcium and urinary phosphorus were decreased. Following this, there occurred a decreased fecal calcium and phosphorus excretion and an increase in the urinary calcium and phosphorus excretion. The calcium and phosphorus balances were only slightly affected. Following the cessation of viosterol administration, the fecal calcium and phosphorus promptly rose and the urinary calcium and phosphorus fell slightly. The serum calcium and phosphorus of normal individuals was only slightly affected by viosterol therapy, the nitrogen excretion

was unaffected. No constant changes were noted in the blood plasma cholesterol. No untoward symptoms resulted from the administration of as much as 30 mg ($\frac{1}{2}$ gram) of viosterol a day.

In a further study of the effect of viosterol on calcium metabolism, Bauer and Marble (*Ibid* p 21) report that a case of osteoporosis was greatly improved by the administration of viosterol in conjunction with a *high calcium diet*. A case of osteomalacia with tetany secondary to faulty absorption showed immediate and lasting benefit from viosterol. No untoward symptoms were observed in either case as the result of such therapy. The action of viosterol is the same in normal individuals as in individuals with calcium deficiency disease, *viz*, to increase absorption of calcium and phosphorus from the gastrointestinal tract. If there exists a calcium phosphate deficiency of the serum as well as of the bones, the additional calcium and phosphorus absorbed is retained, in order to establish a normal relationship of calcium and phosphorus in the serum, thus allowing the deposition of calcium phosphate in the bones. According to Bauer and Marble, in calcium deficiency diseases in which there is a calcium phosphate deficiency of the bones only, the consequent retention is not so marked, whereas in normal individuals little or no retention takes place because the serum and bones are both normal in respect to calcium phosphate. The dose of viosterol necessary to produce such changes in the calcium and phosphorus metabolism of individuals with calcium deficiency diseases is much smaller than the amount required to produce these changes in normal individuals.

UNTOWARD EFFECTS.—Certain toxic effects of viosterol were noted

by M. B. Gordon and H. Lieberman (*Am J Med Sci* 183 784 (June) 1932), who administered irradiated ergosterol in the form of viosterol (100 D and 250 D) in doses of 1 to 9 drops a day to 200 infants, who were observed over a period of from 6 months to 1 year. Untoward symptoms were noted in 15 in the following order of frequency: diarrhea, vomiting, loss of appetite, colic and stationary or loss of weight. No case was included in this group unless a definite sequence was obtained, consisting of administration of the drug, appearance of ill-effects, subsidence of the latter on suspension of the drug and, finally, reappearance on the resumption of viosterol. From their study, the authors conclude that a definite pharmacologic idiosyncrasy to minute amounts of irradiated ergosterol (viosterol 250 D) exists in some infants. According to the incidence found in their series, this is of more frequent occurrence than the literature indicates. The drug should be suspended on the appearance of any ill effects and permanently discontinued in the event of reappearance of symptoms on its resumption. The possibility of an idiosyncrasy should in no way detract from the general use of viosterol in either the prophylactic or the therapeutic treatment of rickets, in the opinion of the authors.

K. Strauss (*Ztschr f Kinderh* 52: 556 (Mar 14) 1932) cites reports from the literature in which large doses of viosterol resulted in severe cachexia and death of the animals, and the necropsies revealed calcium deposits and degenerative processes in the vital organs. On the other hand, some experimenters noted a loss of calcium in the skeleton of animals fed with large doses of viosterol. In general, the injurious

effects were noted only after excessive doses they have also been noted, however, after comparatively small doses. The case of a rachitic child, aged 18 months, is reported to whom 100 mg ($1\frac{1}{2}$ grains) of viosterol had been administered in the course of $2\frac{1}{2}$ months. The writer describes the observations during the necropsy, particularly the calcification processes in the skeletal system. He noted that, as in the spontaneous cure of rickets, a new zone of calcification develops far toward the epiphysis, whereas the proliferated cartilage of the rachitic zone remains uncalcified. The osteoid trabeculae of the diaphysis and of the metaphysis calcify likewise to a considerable extent, but certain sections remain free from calcium. Later in the healing process, new osteoid margins develop, which far exceed the normal in regard to surface as well as depth, *i e*, they still have some rachitic characteristics. The author discusses 3 possible explanations of the calcification process in the rachitic bone (1) the humoral theory, (2) that perhaps the viosterol exerts a certain influence on the colloids by producing an increased calcium affinity, and (3) that the influence on the bone cell itself is the primary action of the viosterol.

An interesting observation was made by J B Duguid, M M Dugan and J Gough (J Path and Bact 35 209 (Mar) 1932), who found viosterol to be more toxic to rats fed a certain synthetic vitamine-free diet of high calcium content than to rats on a normal diet. The absence of vitamins and the high calcium content were considered as possible agents in determining the toxicity, the high calcium content being found to be the more powerful of the two. After reduction of the calcium and also the phosphorus content of the diet, some

evidence was deduced suggesting that the absence of vitamins also contributed, but this evidence is not accepted as convincing. The toxicity was estimated chiefly on the finding of arterial and renal calcification. Arterial lesions are accepted as reliable indications of poisoning in the rat. Renal lesions were noted to occur in viosterol poisoning in 2 forms, *viz*, as calcification of the renal arterioles, and as calcareous cast formations in the renal tubules. The former appeared as part of a general arterial involvement and, as such, was taken as a reliable indication. The latter was found to be a lesion of too common occurrence in the rat, independently of the administration of viosterol, to be admitted as reliable evidence of toxicity.

ERYSIPELAS.—TREATMENT.

—J M Davidson (Brit M J 1 929 (May 21) 1932) reports 51 cases of erysipelas treated by exposure to an artificial source of ultraviolet radiation, the exposure being from one and a half times to twice that required to produce a definite erythema on the normal skin. Before treatment is begun, any preparation previously applied is carefully removed from the affected area and surrounding skin.

In the few cases in which definite extension occurs through the erythematous area, the treatment is repeated 1 or 2 days later if a margin of healthy skin can still be included. Following the irradiation, the affected part is left uncovered.

A Levison (Med Klin. (Aug 12) 1932) cites 4 cases of erysipelas in which he resorted to the intravenous injection of a solution of acriflavine hydrochloride. He employed from 5 to 10 cc ($1\frac{1}{4}$ to $2\frac{1}{2}$ drams) of 0.5 per cent solution of acriflavine hydro-

chloride administered on 2 or 3 successive days

ERYTHEMA NODOSUM.—

ETIOLOGY.—H Ernberg (Nord med tidskr 4 230 (Apr 9) 1932) explains erythema nodosum as an autogenous tuberculin reaction of the organism and he concludes that the condition must practically be regarded as tuberculosis. In an unbroken series of 39 unselected cases, all the patients were found to have tuberculous infection, chiefly in the pulmonary region. No examination in cases of erythema nodosum is complete without x-ray examination.

J O Symes (Brit J Dermat 44 181 (Apr) 1932) feels certain that persons who have been suffering from erythema nodosum are particularly liable to develop an acute and often fatal form of tuberculosis within 6 months of the illness, the most common form being pleural effusion and acute general tuberculosis. In a series of cases which he reported 3 years ago tuberculosis appeared within 6 months in 10 per cent. General tuberculosis developed in 2, mononuclear pleural effusion in 5, and tuberculous meningitis in 1 case.

Five cases of erythema nodosum intimately associated with tuberculosis and 3 cases following streptococcal sore throat are reported by W R F Collis (Quart J Med 1 141 (Jan) 1932). These facts suggest that erythema nodosum is a type of hyper-reactive tissue response to different bacterial allergens and responsible allergens are commonly tuberculous and hemolytic endotoxins.

ETHYLHYDROCUPREINE.

—*Untoward Effects*—In a review of the literature on the subject, C M Swab (Arch Ophth 7 285 (Feb)

1932) finds but few recorded instances of impaired visual function resulting from the use of this drug. He reports a case in which *amblyopia* developed following the administration of 40 grains (2.6 Gm) of ethylhydrocupreine, but considers that it was probably an instance of idiosyncrasy.

With each dose of the drug 5 ounces (150 cc) of milk was given to lessen the concentration of the free hydrochloric acid in the gastric contents, thus lengthening the time necessary to convert the base into the acid salt, and thereby preventing its rapid absorption into the blood stream in concentrations sufficiently high to produce symptoms of a toxic character. In the case cited, the central visual acuity returned quickly after the withdrawal of ethylhydrocupreine and the substitution of strychnine, amyl nitrate and hot compresses. The form field was not found to be damaged to any extent when enough vision was present to permit of the necessary investigation.

Even though there was a complete absence of color perception, there was an eventual return of the fields for blue, red and green. The field for blue became full after a period of 6 months, the field for green showed some increase in size but was still greatly contracted, the field for red was entirely inside that for green, and was present merely in a small area around fixation. Even with such markedly reduced color fields, the patient experienced no subjective symptoms due to this limited color perception.

H L. Scales (J A M A 98 1373 (Apr 16) 1932) reports the development of *amblyopia* resulting from the administration over a period of 3 days, of the recommended dose of optochin base in a case of lobar pneumonia. Ob-

struction in the central retinal artery came on sometime between the fifth and fifteenth day of blindness and the patient still had no useful vision 4 months later when the case was reported

EXOPHTHALMOS. —TREATMENT.—B T King (West J Surg 39 602 (Aug) 1931) believes that the exophthalmos of hyperthyroidism is due to orbital edema produced by accelerated arterial circulation with impeded venous drainage, due to mechanical interference by commissures and foramina. He advises ligation of the internal carotid for severe cases of exophthalmos, and describes Naffziger's operation of orbital decompression in which a portion of the outer orbital wall is excised. His deductions are made from 1500 cases operated on for goiter, half of which were diagnosed as exophthalmic goiter. About half of the latter were associated with exophthalmos.

E Delord and H Viallefont (Ann d'ocul 169 730 (Sept) 1932) report a case of intermittent exophthalmos which they believe was due to an arteriovenous aneurism. The exophthalmos occurred intermittently at frequent intervals during 8 months. By prolonged compression of the carotid artery during the period of a month a complete cure was obtained.

In a case of exophthalmos, which persisted after thyroid extirpation, reported by H Stewens (Ztschr f Augenh 75. 137 (Sept) 1931), treatment with hypophysin was followed by disappearance of this symptom.

PULSATING —TREATMENT.—May (Klin Monatsbl f Augenh 88 184 (Feb) 1932) discusses the conservative treatment of pulsating exophthalmos. He advocates gradual compression of the carotid artery to re-

tard the blood current. One case is reported in which the patient wore a truss-like collar constantly day and night. After 12 weeks the exophthalmos and pulsation had almost completely subsided. Two other cases are reported: one treated by the same method which promises a good result, and another treated surgically.

For the relief of pulsating exophthalmos resulting from an arteriovenous communication, ligation of the internal and external carotid arteries and the superior ophthalmic vein is recommended by A Kolodny (Am J Ophth 15 327 (Apr) 1932). He reports a case which was treated successfully by this method.

EYE.—CYSTS, CORNEOSCLERAL.—Fourteen cases of corneoscleral cysts were collected by M L Berliner (Arch Ophth 7 224 (Feb) 1932), only 3 of which were recognized during life. These cysts usually formed after perforating injuries or ulcers or after operative intervention.

DEVELOPMENTAL DEFECTS.—**Diagnosis.**—It is pointed out by I C Mann (Lancet 1 1 (Jan 2) 1932) that developmental defects in the eye very frequently resemble pathologic lesions and, conversely, many lesions resulting from disease may reproduce developmental anomalies. It is often helpful to arrive at a differential diagnosis by locating several defects in the same eye, *e g*, a coloboma of the disc may be mistaken for a pathologic lesion but when found associated with a pupillary membrane the diagnosis of coloboma is supported.

FOCAL INFECTION.—Sinuses.—The relationship between sinusitis and diseases of the eye is discussed by J E MacKenty (Am. J Ophth 15.27

(Jan) 1932), who bases his deductions on knowledge of the literature and experience with 255 cases afflicted with eye involvement. He reports that many cases with proved tuberculosis or syphilis improved only after thorough surgical treatment of sinus conditions. He states that sinusitis is never strictly confined to a single sinus. All the sinuses on the same side are usually affected. The posterior ethmoid and sphenoid regions are the danger zones for the optic nerve and the eyeball. Unilateral eye involvement is significant of a focal cause, bilateral involvement is usually indicative of a general cause.

The affected eye is usually on the same side as the most active sinus involvement. Chronic pansinusitis is usually associated with a chronic osteitis of all the bony sinus walls and for this reason it is usually only partially curable. He feels that scientific opinion is veering towards focal infection in the nasal sinuses as one of the common causes of uveitis. Adequate, radical and skillful surgery, when performed early and before sensitization takes place, accomplishes gratifying results. In highly sensitized cases and in those with no immunity, however, it is often disappointing. In these cases immunology may be helpful.

FUNDUS.—Anomalies.—Differential Diagnosis—Attention is called to certain anomalies of the fundus which may be mistaken for pathologic lesions. A. J. Bedell (J. A. M. A. 98. 449 (Feb 6) 1932) points out that *epipapillary membranes* often simulate inflammatory tissue; *hyalin or colloid bodies in the disc* simulate a swelling of the optic nerve; *medullated nerve fibers* resemble an exudate; *ectasia of the optic nerve sheath* may be incorrectly diagnosed as glaucoma or, if white, as optic atrophy,

and *congenital defects of the choroid and the optic nerve* may be mistaken for areas of choroidal atrophy.

FUSION.—Reflex Convergence.—N. A. Stutterheim (Brit. J. Ophth. 16 20 (Jan) 1932) stresses the point that the phenomenon of fusion of the two ocular images is a psychologic phenomenon and not optical or physiologic. The ophthalmologist should not talk of fusion but of reflex convergence which is a measurable function and not a psychologic phenomenon. He states that all motor coordinations are performed by the function of involuntary or reflex convergence which can be measured by the patient's ability to overcome the action of prisms.

HEMORRHAGES.—Treatment.—The oral administration of horse serum is considered by F. Balacco (Lettura oftal. 8 644 (Dec) 1931) a specific for the promotion of absorption of intraocular hemorrhages. It is particularly useful in the most delicate operative cases.

Three cases are reported by F. C. Cordes and W. D. Horner (Am. J. Ophth. 15 942 (Oct) 1932) in which a second intraocular hemorrhage followed a few days after the first produced by trauma. Attention is called to the fact that in the 3 cases a simple contusion with hyphema was followed by marked recurrent hemorrhages within 3 to 5 days after the injury, although absorption of the primary hyphema was taking place. The writers advise **physical rest** and **mydriasis** for all cases of **contusion**. Because atropine may precipitate glaucoma, they caution against its use except for those cases in which iritis develops. In the *early stages of hemorrhage into the vitreous* they recommend the use of ice compresses, calcium chloride and ergot; in the

later stages, heat and subconjunctival injections of saline or Ringer's solution.

INSTRUMENTS.—Eyelid Everters.—E Oláh (Klin Monatsbl f Augenh 88 95 (Jan) 1932) advises the use of a pair of his instruments for examining a large number of conjunctival sacs in succession, especially for cases of trachoma. Each instrument consists of a handle with a spatula at one end and a blunt curved hook at the other. Two are required, one held in each hand, for everting the eyelids so that the hands of the surgeon need not come in contact with the infected conjunctiva.

LENSES.—Contact.—R von der Heydt (Am J Ophth 15 946 (Oct) 1932) describes his method for fitting contact glasses. He has devised a gauge for measuring the height of the corneal segment of both the eye and the contact glass. He states, however, that, while this instrument is a very definite aid, it is not essential for fitting contact lenses.

Indications—V Much (Acta ophth 9:249, 1931) advocates the use of contact glasses (1) for the relief of symptoms in trichiasis, (2) for curing recurrent corneal erosions and corneal herpes; (3) for the prevention of symblepharon after burns; (4) for the improvement of vision in very high myopia, in which a combination of a contact glass with a weak concave lens gives better vision than very strong concave lenses, (5) for unilateral aphakia when the fellow eye is normal; (6) for the retention of a corneal transplant; (7) for cases of keratoconus because of its optical as well as its flattening effect on the conical cornea, with consequent improvement in visual acuity. Umbral contact glasses may be used to relieve

photophobia in albinism, aniridia, iritis, and parenchymatous keratitis.

Tinted—The advertised claims and the transmissive properties of tinted lenses are discussed by W W Coblentz (Am J Ophth 15 932 (Oct) 1932). He refers to a previous discussion of glasses for the protection of the eye from glare in which he showed that only the darkest shades of tinted lenses protect the eye from the intense glare of visible radiation. He states that the protection of the eye from ultraviolet solar radiation reflected from average surroundings is of minor importance. Dark glasses which are opaque to ultraviolet rays should be worn to avoid injury from artificial sources of ultraviolet light used for therapeutic purposes.

A Birch-Hirschfeld (Ztschr f Augenh 77 161 (May) 1932) finds that a faintly bluish-violet glass reduces glare and is of help to persons with impaired color sense.

MUSCLES.—Diplopia.—Diplopia and other disorders of binocular projection are discussed by A Duane (Arch. Ophth 7 187 (Feb) 1932), who points out that disorders of binocular fixation are accompanied by corresponding disorders of projection. He differentiates between physiologic and pathologic diplopia and divides diplopia into 3 varieties, *i.e.*, lateral, vertical and torsional. When the amount of deviation disclosed by objective examination differs from the amount shown by subjective examination, the condition is known as *incongruous diplopia*. This type of diplopia may be found in all kinds of deviations.

Ocular Fatigue.—The development and operation is described by C Berens and E K Stark (Am. J. Ophth. 15 216 (Mar) 1932) of their latest accommodation *ergograph* for the study of

fatigue of accommodation This instrument provides accurate control of rest periods and of the rate of approach and recession of the test object which is kept under constant illumination The mechanical work is simplified The 2 methods for the study of fatigue of accommodation are (1) the sustained and (2) the repeated effort tests In the former method the test object is kept as close to one or both eyes as possible In the latter, the test object is repeatedly brought to the patient's near point

In another monograph (Am J Ophth 15 527 (June) 1932) the same authors conclude, from their experimental study of ocular fatigue, that a more rapid recession of the accommodation near point was found under lowered than under normal oxygen tension They found that fatigue of accommodation is not easily produced They are of the opinion that Duane's standard for the near point of accommodation for all ages is not a reliable criterion of ability to accommodate without rapid fatigue

Orthoptic Training—Fusion training and orthoptic treatment of motor anomalies are advocated by O F Wolfe (*Ibid* 15 618 (July) 1932) in psychoneuroses, strabismus, intermittent suppression, monocular suppression, amblyopia, subnormal accommodation and convergence insufficiency

Paralysis—Bilateral—A child, 2½ years old, is reported by A Colrat (Arch d'ophth 48 822 (Dec) 1931) to have had paralysis of lateral motion in both eyes

Central Lesions—Three cases of supranuclear paresis of the internus, 7 of anterior internuclear ophthalmoplegia, and 8 of posterior internuclear ophthalmoplegia are reported by P A Jaensch (Arch f Ophth 125 592, 1931) who discussed their clinical as-

pect Epidemic encephalitis was responsible for 8 and multiple sclerosis for 5 of the 18 cases reported Syphilis was not the etiologic factor in any case An associated facial paresis occurred in only 2 of his cases Jaensch states that supranuclear weakness is characterized mainly by the inability of synergic muscles to carry out definite functions, the interference with ocular movements affects each eye in the same manner and to an equal degree, *e g*, adduction of one eye and abduction of the other eye Paralysis caused by a lesion in the brain stem, base or nuclei, produces diplopia due to paralysis of the individual muscles of the eye In supranuclear paresis total or impaired ability of the eyeball to turn inward occurs, but during convergence, adduction occurs without difficulty *Anterior internuclear ophthalmoplegia* is the name applied to a lesion in the pons or before the posterior longitudinal bundle *Posterior internuclear ophthalmoplegia* applied to a lesion in the posterior longitudinal bundle, resulting in a disturbance of the function of lateral rotation either of the internal or external rectus muscle

OCULAR MOVEMENTS.—The corticonuclear tracts for associated ocular movements are discussed by W G Spiller (Arch Neurol and Psychiat 28 251 (Aug) 1932) These movements are represented in the cerebral cortex He points out that Ferrier evoked movements of the head and eyes by electrical excitation of a small part of the frontal cortex O Foerster (Lancet 2 309 (Aug 8) 1931) has determined existence of a center for lateral ocular movements in the posterior part of the superior temporal convolution The vertical associated ocular movements have also been localized in the cortex by stimulating the eye area on

one side but only after the internal rectus muscle on the same side and the external rectus muscle on the opposite side have been divided. To summarize there is a center for associated movements in the frontal lobe and another in the posterior part of the superior temporal convolution. He presents a case of paralysis of associated ocular movements and also presents the microscopic serial sections from the level of the abducens nuclei to the beginning of the third ventricle.

PARALYSIS—Oculomotor Nerve.

—*Etiology and Treatment*—Two cases of complete unilateral paralysis of the oculomotor nerve were observed by A. Valerio (Arch. d'opht. 49 181 (Mar) 1932), occurring about 2 days after a prophylactic injection of tetanus antitoxin. Under local diathermy both patients recovered completely. Congestion was considered to be the underlying condition.

Trochlear Nerve—Etiology—P. A. Jaensch (Ztschr. f. Augenh. 75 58 (Aug) 1931) reports a case of pineal tumor in which the only manifestation was a bilateral paralysis of the trochlear nerve. The diagnosis was confirmed by necropsy. Only 6 cases of bilateral trochlear paralysis without involvement of other ocular nerves have been reported in the literature.

PNEUMOCOCCUS DISEASES.

—*Treatment*.—E. Lobeck (Arch. f. Ophth. 127 395, 1931) finds that the virulent types of pneumococci predominate in *ulcus serpens* and suppuration of the lacrimal sac, while the avirulent type predominates in simple pneumococcus conjunctivitis. Hence, the writer proves the futility of specific serum therapy in pneumococcus diseases of the eye because the only therapeutically active sera are those of pneumococci

types 1 and 2, and eye diseases due to these types are rare.

TUMORS—Treatment—T. H. Butler (Brit. J. Ophth. 16 152 (Mar) 1932) reports that he cured 6 cases of *limbal tumor* by the use of radium. The lesions were hemangioma, limbal sarcoma, melanotic malignant growth with conjunctival invasion and melanotic carcinoma.

The use of the **Shahan thermophore** is recommended by M. F. Weymann (Am. J. Ophth. 15 310 (Apr) 1932) as an ideal instrument for the removal of *papillomata at the limbus* and reports several cases which were treated successfully by this method. Attention is called to the fact that the corneal limbus is a site of election for epithelial new-growths, since it is a transition zone from the cylindrical and cuboidal epithelium of the conjunctiva to the stratified squamous epithelium of the cornea. Papillomata and malignant carcinomata occur at the limbus. He stresses the fact that papillomata of the limbus are potentially malignant tumors and he advises periodic observation of the cases operated upon because of the frequency of recurrences.

THERAPEUTICS.—Anesthesia.—F. A. Davis (*Ibid.* 15 208 (Mar) 1932) recommends tribromethanol (avertin) as a *general anesthetic* in eye surgery, its advantages being as follows: the extra-ocular muscles are relaxed, the eye is quiet, and bleeding and intra-ocular tension are markedly reduced. The drug is usually administered by rectum in a 3 per cent normal salt solution at body temperature. The dose is 0.1 Gm per kg of body weight (or $1\frac{1}{2}$ c.c.—24 minims—of a 3 per cent solution per pound of body weight). A simple cleansing enema is given about 3 hours before operation. Avertin is introduced

into the rectum through a fine French catheter attached to a large glass syringe. The patient falls asleep and usually is ready for operation within 20 minutes. Complete anesthesia lasts about 4 hours.

The use of 2 per cent larocaine (combined with epinephrine) is recommended by A. Balcerek (Klin Monatsbl f Augenh 88:527 (Apr) 1932) as a new *local anesthetic* in ophthalmology. He finds that it is cheaper than cocaine, it does not alter the corneal epithelium or the intra-ocular tension, and it does not produce mydriasis.

Percaïne, which is 10 times as active as cocaine as an anesthetic, is recommended by A. Terson (Ann d'ocul 169:375 (May) 1932) for eye work in 1 or 2 per cent solutions by instillation or injection.

Diathermy.—Physiological Action.—E. F. Moncreiff, J. S. Coulter and H. J. Holmquest (Am J Ophth 15:194 (Mar) 1932) investigated the thermal effect of diathermy produced in the conjunctival sac, the anterior chamber, the vitreous chamber and the apex of the orbit of dogs. This experiment was performed under anesthesia by passing high frequency (diathermy) currents of graduated strengths through the eye and measuring the temperature changes in different parts of the eye with a thermocouple. The results indicate that by means of diathermy currents of 150 ma, 300 ma, and 600 ma, it is possible to produce in the anesthetized dog an average maximum elevation of 7.11° C in the conjunctiva; 6.54° C in the anterior chamber, 6.98° C in the vitreous, and 4.49° C in the orbit.

Epinephrine.—Action on Pupil.—L. Mayer (Ibid 15:35 (Jan) 1932) reports that epinephrine 1:100 causes dilatation of the pupil, beginning imme-

diately after its instillation in the conjunctival sac and reaching a maximum in from 5 to 6 minutes. Dilutions of 1:250, 1:500 and 1:1000 do not produce dilatation of the pupil in the majority of cases.

Instillation.—From experiment and observation, E. Oláh (Ibid 15:510 (June) 1932) concludes that *solutions and ointments* placed into the lower sulcus of the conjunctiva reach the upper sulcus in very dilute form, if at all. He recommends the introduction of solutions and ointments into the upper fornix if action upon the entire surface of the conjunctiva is desired.

EYEBALL.—ANOPHTHALMOS.—Diagnosis.—According to E. Redslob (Ann d'ocul 169:433 (June) 1932), many cases of so-called anophthalmos in the newborn are really cases of extreme microphthalmos. Careful examination of the orbit usually reveals the presence of a rudimentary eyeball. True anophthalmos is rare. Only 7 cases, including one observed by the writer, are reported in the literature.

FOREIGN BODY.—The fact is emphasized by F. A. Kiehle (Arch Ophth 7:180 (Feb) 1932), that removal of an intraocular foreign body does not end the case, but is only the beginning of a struggle against a slow degenerative change in the eyeball. He urges careful postoperative observation for years so that a more accurate record can be obtained as to the ultimate status in these cases.

Attention is called by J. Fejer (Am J Ophth 15:224 (Mar) 1932), to the fact that encapsulated intraocular foreign bodies may remain for years without causing irritative symptoms or sympathetic ophthalmia. He cautions against too hasty removal of iron splin-

ters in those cases in which they can be removed only with considerable destruction of ocular tissue. Three cases are reported to show that at times there is marked tolerance of the eye to metallic foreign bodies. In 2 of the cases useful vision was retained even after 5 and 18 years following injury.

In a discussion of intraocular foreign bodies F. H. Verhoeff (*Ibid* 15 685 (Aug) 1932) makes the following observations and deductions: (1) incarceration of the iris in a corneal wound almost invariably excludes the presence of an intraocular foreign body, (2) a hole in the iris, recognized either by direct illumination or by retroillumination, indicates the path of entrance of a foreign body, (3) a nonperforating wound in the fundus suggests the presence of a foreign body lying free in the vitreous, (4) blood in the vitreous following an injury indicates the probable presence of a foreign body and the advisability of an x-ray examination; (5) a roentgenogram is justifiable in every case of injury to the eye, no matter how trivial that injury may be, (6) x-ray diagnosis of "foreign body close behind the eyeball" should not be accepted without confirmation by a magnet test and an ophthalmoscopic examination.

Treatment.—Bearing on treatment, Verhoeff (*loc cit*) makes the following deductions: (1) repeated attempts to dislodge a foreign body by means of a magnet should be made on at least 3 successive days before abandoning this procedure, (2) a small hypopyon is not a contraindication to an extraction by a magnet; (3) the safest way to remove a magnetic foreign body from within the eye is through the anterior chamber. The posterior route should never be used unless there is a large open wound of the sclera or when it is found impos-

sible to bring the foreign body into the chamber from behind the lens, (4) a foreign body should never be removed through its corneal wound of entrance unless the foreign body is engaged in the corneal wound or unless the wound is large and gaping and near the limbus, (5) the pupil should be completely dilated before attempting to remove a foreign body from the vitreous chamber by way of the anterior chamber; (6) a keratome incision should be made below the cornea if more convenient for the removal of a foreign body, (7) the point of the keratome should be introduced as far back from the limbus as possible, (8) when a foreign body is firmly stuck in the iris, that portion of iris should be drawn out through the keratome incision, with the scissors a small hole should be made in the iris and then the magnet should again be applied; (9) when a foreign body has severely injured or has lodged within the lens, the lens should be removed at the same time the foreign body is extracted. In the latter case, however, the entire operation may be delayed until the resulting cataract prevents useful vision.

Where the anterior route is not possible, Verhoeff proceeds as follows after having dissected up a conjunctival flap and inserted a suture ready to be tied, an incision is made in the sclera with repeated sweeps of the cutting edge of a knife-needle. This incision is made parallel to the ora serrata at a distance of about 5 mm from the limbus. After the sclera has been partly cut through, the incision into the perichoroidal space is completed by forcing the blunt point of the knife beneath the remaining scleral fibers and then cutting outward. With the magnet, the foreign body may now usually be dislodged or its removal

may be facilitated by a small incision in the ciliary body

H S Miles (Arch Ophth 7 925 (June) 1932) considers that it is always advisable to try the **electromagnet** for it may attract into the anterior chamber very small foreign bodies overlooked by x-ray. When a foreign body measures 3 mm or less in its longest diameter, he prefers to bring it around the lens and through the pupil. He feels that he has never injured a lens by this procedure. When removal was accomplished through the sclera, most cases did not progress favorably. To avoid subsequent detachment of the retina, he suggests **cauterization of the scleral wound**. He finds that steel is just as likely to destroy the eye as is copper.

OPERATION.—Fixation—F Romeick (Klin Monatsbl f Augenh 87 512 (Oct) 1932) recommends the following procedure for fixation of the eyeball in operations. Insert a suture close to the limbus, through the conjunctiva and the superficial layers of the sclera. Tie the suture and cut it off short. Instead of grasping the sclera, grasp the little knot with the fixation forceps. After the operation, cut the knot.

TENSION.—H K Muller (Arch f Augenh 105 516 (Jan) 1932) has found that in measuring tension of the eyeball, the heavier the weight used on the tonometer, the greater the possibility of error.

The effect of epinephrine on the intraocular pressure is discussed by W S.

Duke-Elder, P M Duke-Elder and J C Colle (Brit J Ophth 16 87 (Feb) 1932) They conclude that it dilates the pupil without significant influence on the intraocular pressure, in small doses it raises the intraocular pressure, and in large doses it lowers the pressure. Epinephrine raises the intraocular pressure by dilating the minute blood-vessels and lowers the pressure by constricting them.

W S Duke-Elder and P M Duke-Elder (*Ibid* 16 321 (June) 1932) are of the opinion that the activity of the extraocular and intraocular muscles has an effect upon the circulation of the intraocular fluid and consequently upon the intraocular pressure.

EYELID.—BLEPHAROCONJUNCTIVITIS—*Treatment*.—Very satisfactory and permanent results have been obtained by P Gillesen (Klin Monatsbl f Augenh 88 92 (Jan) 1932) with **cerophthol** in the treatment of acute and chronic *blepharoconjunctivitis*. Cerophthol is a salve consisting of beeswax, finely precipitated mercury, and acetate of lead.

WINKING—From his examination of 500 patients, R W Danielson (Am J Ophth 15 611 (July) 1932) concludes that some could wink either eye with equal facility, others were unable to wink either eye, and certain subjects could wink one or the other eye more readily. He found that the poorer eye was usually the one more easily winked. He points out the practical value of this knowledge in medico-legal cases.

F

FACIAL PARALYSIS.—ANATOMY.—The anatomy of the facial nerve is most important and the usual course and relations of the nervus facialis as well as their practically important variations were discussed by O. V. Batson (Arch Otolaryng 14 108 (July) 1931). The portion of the facial nerve within the temporal bone is alone considered in this discussion. It is divided into 5 topographic portions (1) meatal, (2) geniculate, (3) tympanolabyrinthine, (4) arcuate, and (5) mastoid. The arcuate portion curves over the oval window, becoming the more or less vertical mastoid portion. The meatal portion is of interest (chiefly to the neurootologist) because of its relation to the infratentorial arachnoid space. The geniculate portion is exposed to the dura of the middle cranial fossa in childhood and sometimes throughout life. The canal of the tympanolabyrinthine portion, lying in the wall common to the internal and middle ear, is perforated by small nerve foramina and is the site of dehiscences. The arcuate portion, with the lateral semicircular canal, lies in a dense mass of bone which forms one boundary of the aditus ad antrum. The other two walls of this triangular constriction are the posterosuperior wall of the external canal and the tegmen tympani.

The mastoid portion begins at the level of the eminentia pyramidalis, which houses the stapedius muscle. Between the cavity in the eminentia and the facial canal there is a foramen for the stapedia nerve and sometimes osseous deficiencies. It is significant to remember that these openings and that for the chorda tympani, lower down, are potential routes of communi-

cation between the cavum tympani and the mastoid portion of the nerve.

A landmark, undescribed, for the mastoid portion of the facial canal is the tympanomastoid suture. During the course of an operation this may be located with a probe. The facial nerve lies medial to this suture at a depth which depends on the lateral thickness of the mastoid process.

The distance between the suprameatal spine (Henle) and the sigmoid sinus determines the ease with which the antrum tympanicum can be approached. When this distance is short, more space is obtainable by removing the posterior meatal wall. The other wall, about the sigmoid sinus, must be avoided because of the sinus and because of the mastoid portion of the facial nerve.

PATHOLOGY.—After reviewing some of the literature on *otogenic facial paralysis*, Fremel (Monatschr f Ohren. 65 950 (Aug) 1931) states that the pathology of facial paralysis is still largely hypothetical. The rare opportunity to study a case of facial paralysis in histologic sections induced the author to review the 104 cases that were observed in his clinic during the last 8 years. First he discusses 10 cases in which facial paralysis developed during acute otitis. These patients underwent antrotomy, but although the surgical reports mention perifacial cells and perifacial osteomalacia, nothing is said about the appearance of the nerve itself. In all these cases the facial paralysis disappeared again, and from this it is concluded that in cases of this nature there is probably a mechanical etiologic factor such as pressure. The author further discusses *operative paralysis*. In some of the patients the paralysis was

noted immediately after the anesthesia had terminated, and in others it developed hours and even days after the operation.

The majority of cases of facial paralysis developed in the course of chronic suppurations of the middle ear and in most of these patients the labyrinth was removed. The author further states that his material does not corroborate the assertion of other observers that facial paralysis is more frequent in children than in adults. Among his patients were 95 adults and only 9 children. In the last part of the article the histologic findings on the petrosa of a man, aged 62, are described. Facial paralysis developed in the course of an acute otitis, and the patient died soon after the surgical intervention. The petrosa was prepared in the usual manner. Reproductions of 3 sections are given. The first section shows the destructive process in the nerve.

The suppurative infiltration of the mucous membrane of the middle ear perforated through a fissure in the bone into the canal and destroyed the nerve by abscess formation. At this site the canal contains only an abscess cavity. Above and below the nerve abscess the infiltration continues in the nerve. Section 2 shows the nerve distal from the abscess. The canal is empty, *i.e.*, the nerve has degenerated and so also has the little branch going to the *musculus pyramidalis*.

The surrounding bones show a severe otitic process, and it is probable that the paralysis is a partial manifestation of this process. A third section shows the facial canal medial from the focus of destruction. Here the nerve is mostly intact, but shows here and there degenerated fibers and numerous osteoclasts on the wall of the canal, with intersti-

tial infiltration of the nerve. In this case the pathologico-anatomic form of nerve injury is a suppurative inflammation, originating in the inflammation of the middle ear and of the bone, and can, therefore, be considered as a partial manifestation of the process of the middle ear. However, this case does not justify generalizations in regard to the pathology of other cases.

SURGICAL TREATMENT.—A short résumé of the results of the research made by C. Ballance and A. B. Duel (*Arch. Otolaryng.* 15:1 (Jan.) 1932) in nerve anastomosis and the employment of nerve grafts in the surgical treatment of facial palsy, is an outstanding feature of the literature. Sir Charles Ballance performed his first anastomosis of the hypoglossal nerve to the facial nerve in 1895. His important work on the anatomy and surgery of the temporal bone is widely recognized. A year after the World War, he came to the United States and during his visit suggested to Duel that they retire to a quiet place where animal experiments could be carried out to devise an operation for the cure of facial palsy.

Various types of anastomoses were considered. Patients with an anastomosis of the spinal accessory and facial nerves were unable to use the facial muscles without accessory movements, but a large number of similar anastomoses were done to verify previous experiences. Anastomoses of the *descendens noni*, glossopharyngeal and chorda tympani with the facial nerve were attempted. In every instance in which such anastomoses were done, the facial canal was opened, plugged with gold and carefully inspected, because in Ballance's experience, the stump of the facial nerve was in such close proximity to the anastomosis that there was a question

whether or not tissue had leaped across the scar by residual strands and could thus be suspected of influencing results. In the smaller animals the descendens noni and the hypoglossal nerves were anastomosed with the facial. Then the auriculotemporal nerve was joined to the facial in larger animals, a nerve being utilized that could show no associated movements, this, however, failed to produce the finer movements obtained when the hypoglossal or spinal accessory nerves were used.

For a long time, Ballance had advocated taking the facial nerve out of its canal and running it across the tympanum to obtain length. The technic required to accomplish this without trauma was carefully developed. The use of the great occipital nerve for anastomosis with the facial precluded associated movements. For this reason the great auricular nerve was likewise tried. In an infant, in whom the facial nerve had been largely destroyed by a mastoid operation, one end of the nerve was situated in the parotid gland and the other end presented at the geniculate ganglion. Recovery followed the grafting of the facial proximal portion to the facial distal portion. In a woman 16 mm of the facial nerve had been removed in a radical operation, resulting in complete palsy. A portion of the nerve of Bell was placed in the dehiscence 4½ months after operation, and this patient now has some ability to close the eye.

A baboon in which the intercostal nerve was used for anastomosis with the facial nerve showed complete recovery. In another patient, the nerve of Bell could not be located at operation, while a large cutaneous nerve was uncovered and an attempt was made to connect it with the facial nerve. Its length was

not sufficient, but it was thought that it would work out as well as a motor nerve. Making certain that the distal portion of the nerve was alive, a portion of the third intercostal was placed in the canal, but its length appeared insufficient. A piece of the fourth intercostal nerve was then taken and placed alongside the fragment of the third intercostal nerve and the whole was covered with dental gold. Six days later, the patient obtained the sensation of movement.

No one can predict the degree of recovery in these cases. The animals used in this series of experiments with grafts have shown recoveries that are practically perfect. Twenty-four animals have shown recovery from dehiscences of from 1 to 16 mm. Motor and sensory nerves were both used, with an equal amount of recovery. A child aged 8 months shows recovery which is progressing; at this time the normal expression of pleasure or crying is almost perfect. If a man were like an animal, almost perfect recovery could be obtained, in man it is difficult ever to restore a divided or injured facial nerve and obtain a result that synchronously shows the higher emotions. It is difficult to get the finer gradations of expression through a repaired nerve. In order to find the anastomotic tissue, trauma and scar tissue will result and, therefore, interference with synchronous effect is produced. Fear and laughter may be well expressed, but the finer gradations of emotion will be different from those obtained before injury occurred.

The operation as perfected will restore the facial muscles and avoid the associated movements, which in other operations can be eliminated only at best by training. In addition, this opera-

ation avoids a disfiguring scar in the neck and the loss of function of other muscles. Any anastomotic operation is difficult and this is no exception. No one will be able to do it without taking time enough to master the technic.

Intratemporal anastomosis of the facial nerve is possible and gives good emotional control, according to R. C. Martin (Arch Otolaryng 13 259 (Feb) 1931). He feels that it should be attempted in complete *postoperative facial paralysis* after a suitable time has elapsed for spontaneous recovery. This method may offer hope as a decompressive procedure in cases of *Bell's palsy* in which the patients fail to recover. The treatment of facial paralysis by temporal and masseter muscle grafts has been described by Pickerill. By this method he has obtained far better results than by any other method. The advantages claimed are: (1) that the face as a whole is stabilized to a considerable extent, having 2 tonic muscles at least on the paralyzed side to oppose those on the normal side, and (2) that the patient is given the power of closing the eye on the paralyzed side. This is absolutely definite, and the serious risk, therefore, of corneal ulceration and conjunctivitis is eliminated.

The improvement in appearance is pronounced. The raising of the lower lid and the consequent hiding of the reddened conjunctiva is of itself a decided advantage, and this is quite independent of muscular contraction. The closure of the eye in these cases, and the retraction of the mouth, are voluntary but with constant practice the action in time becomes almost automatic. The author has previously described the technic of the operation and he has had no reason to modify it, except that he finds that he is increasingly inclined to

favor the use of local anesthesia, because thereby not only can the patient's cooperation be used but also, as it were, the tension can be better matched on the sound side. The amount of local anesthetic required is surprisingly small, especially if a pool is injected in the region of the foramen ovale.

The author believes, too, that perhaps it is better to undertake the grafting in 2 stages, the first for the temporal muscle and the second for the masseter, at an interval of some weeks. An interesting physiologic problem crops up in some cases, it is what the author calls "impulse spread." In these cases the voluntary contraction definitely spreads from the grafted muscle to the paralyzed muscle (the fibers of which can be definitely seen to contract) and sometimes to other muscles.

FRACTURES.—FRACTURE OF CALCANEUM—L. Lenormant and P. Wilmoth (J de chir 40 1, 1932; Surg Gynec and Obst 55 562 (Dec) 1932) divide fractures of the os calcis into 3 types. In the *first degree*, the posterior facet breaks into the underlying spongy bone for a distance of 1 to 3 mm, the tuberosity angle is reduced about 20°, the penetration is associated with a slight elevation of the head astragalus, a slight change in the orientation of the surfaces of the midtarsal joint. In a fracture of the *second degree*, the posterior articular facet is driven still further downward into the underlying spongy bone, the os calcis is flattened and widened, and the tuberosity angle is zero. In a *third degree* fracture there is complete penetration of the body of the calcaneum, complicated accessory lines of fracture, marked subluxation of the calcaneo-astragalus and midtarsal joints. The

normal relations are disturbed even in tibiotarsal joints. The foot deviates in valgus and the plantar arch is effaced. The tuberosity angle is a minus 20° or 30°.

The authors call attention to the trabecular systems of the os calcis and offer an explanation for the fracture on this basis. Three systems of trabeculae can be distinguished: number *one*, the most important, runs from the posterior articular facet, posteriorly to the tuberosity, and is a continuation of a similar system in the astragalus. The *second* extends from the facet anteriorly to the head, the *third* unites the head and the tuberosity and is confined to the lowest portion of the bone.

This arrangement leaves a triangular zone of minimal resistance in the center of the body immediately beneath the posterior facet which is easily seen in the x-ray as a clear area. This area is regarded as being a weak portion of the os calcis and weak osteogenetically.

Treatment.—Lenormant and Wilmoth suggest elevation of the posterior articular facet by open operation, and maintenance of this correction by underlying osteoperiosteal grafts. The grafts fill in the defect in the body of the bone. Fifteen cases are reported treated by this method, the results in 14 being good. The operative procedure is reserved entirely for the second and third degree fracture.

Boehler has devised a method for reduction of os calcis fractures. Skeletal traction on the os calcis is used, the pin being inserted in the posterior third of the os calcis for direct traction; a second pin is inserted in the lower third of the tibia for countertraction. The dislocated posterior facet is elevated from the depression in the os calcis by this method, the widening and flatten-

ing of the os calcis are restored by the lateral pressure of a clamp. Boehler reports successful results by this more conservative method.

FRACTURE OF LEG.—*Treatment.*—A new method has been described by Roger Anderson (Surg Gynec Obst 54:207 (Feb) 1932) for the treatment of fractures of the femur, femoral neck, intertrochanteric fractures, fractures of the shaft of the femur, fractures of the tibia, dislocation of the symphysis pubis, and fractures of the pelvis.

The method described utilizes skeletal traction upon the injured leg and employs the well leg for countertraction. The principle is an old one, having been employed by Hoke, Steindler, Coonse, Jones and others. The apparatus is original and worthy of commendation. Twelve cases are reported, including a fracture of the left ischium and left pubic bone, fracture of the neck of the right femur, 2 cases of intertrochanteric fracture, 4 cases of fracture of the femoral shaft, 1 of subtrochanteric fracture, and 1 of fracture of the tibia.

The results were quite excellent. Anderson claims for his method that it is inexpensive, simply constructed, easy to apply, hospitalization of patient is minimized, permits physiotherapy to the part, and assures better anatomical and physiological results.

The new method described by the author is based on sound reasoning. His claims do not appear in the least exaggerated and his apparatus is quite ingenious.

FRACTURE OF METACARPALS AND PHALANGES.—R. W. McNealy and M. E. Lichtenstem (*Ibid* 55:758 (Dec) 1932) reviewed 1323 such fractures distributed as follows: distal phalanx, 822 cases, middle phal-

anx, 221, proximal phalanx, 189, metacarpals, 91 The authors present the functional anatomy involved in fractures of the metacarpals and the pha-

fundus alone acts on the terminal phalanges, the flexor sublimis and the flexor profundus together flex the proximal interphalangeal joint, flexion of the



Fig 1—*a*, Fractures of the middle phalanx at various levels, *b*, fractures of the proximal phalanx at various levels (R W McNealy and M. E Lichtenstein Surg Gynec Obst)

langes, and stress the importance of the muscular attachments in the successful management of metacarpal and phalangeal fractures Flexion is more powerful and complete than extension of the fingers The flexor digitorum pro-

metacarpal phalangeal joint is effected by these muscles, assisted importantly by the interossei, lumbricales and flexor digiti quinti brevis Extension of the phalanges is brought about by the united action of the extensors, of the digits, the

interossei and lumbricales. Extension of the fingers at the metacarpal-phalangeal joints is produced solely by the long extensor muscles. Separate extension of the index finger only is possible, the 3 inner fingers can be completely extended together only because of the connecting bands joining the extensor tendons on the back of the hand. (Acute flexion of interphalangeal and metacarpal-phalangeal joints of one finger alone is impossible if the remaining fingers are maintained in full extension at the metacarpal-phalangeal joints.)

Distal Phalanx—The terminal phalanx is attached only at its proximal end to the middle phalanx. Its distal portion is free and not subject to the action of either the intrinsic or extrinsic muscles. It is here that considerable crushing of fragments may occur, but with slight displacement.

Proximal Phalanx.—Fractures involving the proximal portion of the terminal phalanx are subject to the action of the flexor profundus tendon and the extensor communis tendon. A fracture here may develop a varying degree of dorsal displacement of the

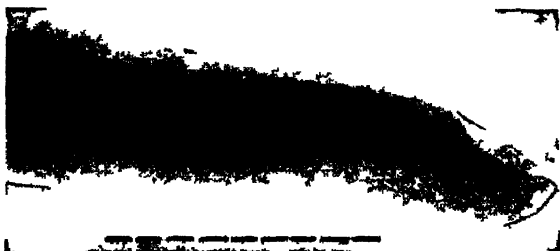


Fig 2—Volar spur resulting from fixation of fractured middle phalanx on a straight splint (R W McNealy and M E Lichtenstein Surg Gynec Obst)

proximal fragment. Occasionally the entire proximal fragment may be evulsed.

Middle Phalanx.—Fractures of the middle phalanx owe their displacements to the action of the flexor digitorum

sublimis. This muscle ends in a tendon which separates into 2 portions, which insert one on either side of the middle phalanx at approximately the middle portion. The deformity produced depends on the location of the fractured



Fig 3—Restoration of natural arc by use of a curved splint (R W McNealy and M E Lichtenstein Surg Gynec Obst)

site. If this site is distal to the insertion of the tendon, there occurs a dominant position of the proximal fragment and upward displacement of the distal fragment. When the fracture is proximal to the tendon insertion, there is produced downward displacement of the distal fragment with an upward position of the proximal fragment (Fig 1, a).

The authors emphasize that a failure to take into account these 2 types of displacement of fragments will result in a failure to correct the deformity. When a straight splint is used for the second type of deformity, there results most commonly a downward projecting spur which interferes with flexion of the distal phalanx (Fig. 2).

In the second type, adequate fixation can be had by bringing the distal fragment into line by use of a curved splint, restoring the fragments to the natural arc which was present before fracture took place (Fig. 3).

Proximal Fragment.—The resulting deformity when fracture of the

proximal phalanx occurs is fairly constant regardless of the site of fracture (Fig. 1, *b*) Downward displacement of the proximal fragment is brought about by the action of the interosseus muscle, while upward displacement is due to the action of the lumbrical muscle Here, again, fixation on a straight splint will maintain the deformity and result in impaired function When the distal fragment is brought into line with the proximal fragment by fixation on a

the metacarpal phalangeal joint to the proximal phalanx and assumes a flexed position Fig 4 illustrates graphically the treatment employed by the authors in this type of fracture.

Treatment.—This article deserves commendation for its thoroughness and for its sound anatomical basis The authors make use of the Zuppinger-malleable volar splint, applied to the finger in extension and firmly secured to the palm and wrist by adhesive material

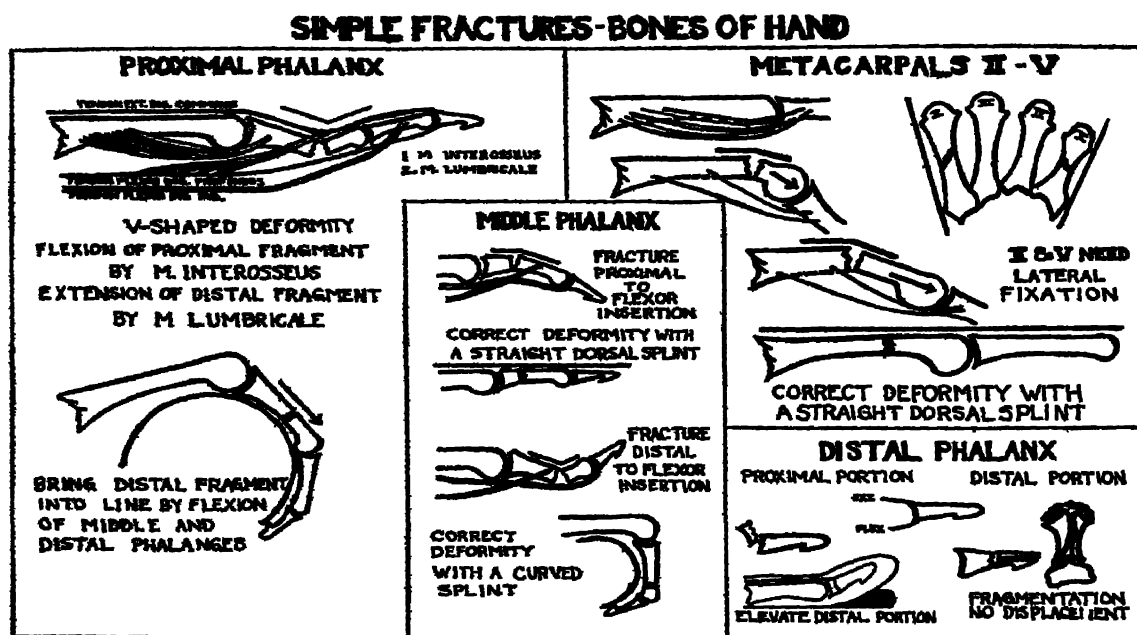


Fig 4—Illustrating mechanisms of deformities produced by the action of the intrinsic muscles and tendons with suggestions of means for overcoming these deformities (R. W. McNealy and M. E. Lichtenstein Surg Gynec Obst)

curved splint, a minimum of deformity will result

Metacarpals, Exclusive of Thumb.—Fractures of the metacarpals usually result in typical deformities, characterized by shortening of the length of the bones due to bowing of the fragments There is a dorsal projection at the site of fracture and volar displacement of the metacarpal head. This deformity is the result of the action of the interosseus muscle, which is a flexor of the proximal phalanx The distal fragment of the metacarpal is attached through

The splint is then bent in a curved manner carrying the finger in an arc of palmar flexion The maneuvering increases the length of the dorsal arc, thereby producing extension, as well as affording a natural curved support for the fractured member

FRACTURE OF METATARSAL BONES.—A brief review of the history of *march foot*, and commonly regarded allied conditions is presented by F. H. Straus (*Ibid* 54 581 (Mar) 1932) but of greater value is the report of a case of march foot with meta-

tarsal specimen showing a concealed fracture surrounded by a typical callous cuff

The patient, aged 30, obese, a waitress by occupation, complained of pain and a hard tumor over the distal end of the second metatarsal, just proximal to the metatarsal-phalangeal joint. The x-ray diagnosis was a malignant tumor of the second metatarsal bone of the left foot, and a leg amputation was advised. The physical examination and past history were entirely negative. The second metatarsal was excised. Straus concludes that fracture of the metatarsal bones may occur insidiously as a result of long walking or standing; that pain and callus may simulate neoplasm, and that the so-called "*Deutschlander's disease*" may belong in this group of fractures of the metatarsal bones.

Deutschlander, in 1925, described a group of 6 cases, the complaints and findings being characterized by gradually increasing pain over the distal shafts of the second and third metatarsal, the appearance of encircling periosteal new bone at the eighth or ninth week (demonstrable in x-ray), the gradual subsidence of symptoms, signs, and finally recovery. Three of the cases ran a febrile course. This, in addition to the late appearance of callus, caused him to conclude that these patients were suffering from a hematogenous bacterial periostitis. He described the swelling as an inflammatory tumor.

FRACTURES OF PATELLA.—The importance of longitudinal frac-

tures of the patella is pointed out by P. M. Lapidus (*J. Bone and Joint Surg.* 14:351 (Apr.) 1932) and the x-ray technic employed to best detect it. He clearly demonstrates the apparent absence of these fractures in the ordinary anterior, posterior and lateral views. These fractures occur in the sagittal plane over the junction of the outer and middle quarters of the patella. The clinical picture is characterized by history of injury, localized linear tenderness over the lateral border of the patella, effusion in the knee joint, comparatively negligible disability. These fractures, if not properly recognized, may lead to disability, but if properly treated (immobilization of the knee) recovery may occur in 6 to 8 weeks. Operative treatment is not recommended.

PATHOLOGICAL FRACTURES.—N. Capener and K. C. Pierce (*Ibid.* 14:501 (July) 1932) have reviewed 1086 cases of *osteomyelitis*. Pathological fractures of the shafts of the long bones occurred in 1½ per cent (18 cases). Osteomyelitis was responsible for 33⅓ per cent of all pathological fractures. They emphasized the extreme importance of regarding massive sequestration as a potential fracture. They recommend a gutter rather than a shallow saucer as a safer mechanical means of dealing with central bone abscesses.

In the removal of sequestra, the utmost care must be taken to preserve the involucrum. Careful splinting during the postoperative convalescent period is imperative.

G

GIGANTISM.—A Mandl, F Windholz and R Routil (*Ztschr f d ges Neurol u Psychiat* 137 649 (Dec) 1931) record the case of a man with acromegaly and gigantism, the condition setting in after a marked inhibition of growth. The history revealed that at the age of 18 the height of the patient was only 138 cm (4 feet 6½ inches). The abnormal increased growth commenced when the patient was 21 and now, at 31, his height is 216 cm (over 7 feet). The patient has an enormous endosellar tumor, acromegaly, and hypogenitalism. He also has galactorrhea, the presence of female sex hormone in the urine, and an abnormally small heart, with hypotony of the vascular system. Anthropometric measurements revealed an abnormal shortness of the trunk and asymmetry between right and left. The patient underwent an operation for removal of the pituitary growth, which microscopic examination showed to be an immature adenoma.

GLAUCOMA.—DIAGNOSIS.—G. Zanettin (*Ann di ottal e clin. ocul* 59.847 (Sept-Oct) 1931) regards diminution of the light sense as one of the earlier symptoms of chronic simple glaucoma. In 17 eyes of persons suffering from chronic simple glaucoma he found the light sense proportionately more frequently reduced in the region of the macula than in the periphery of the retina.

M. Cohen, J Killian and L Halpern (*Arch Ophth* 8 39 (July) 1932) report that no striking difference exists between the blood and spinal fluid of patients with glaucoma and that of patients with other ocular diseases.

TREATMENT.—Two cases of acute glaucoma, which were cured by corneal inflammation induced by calomel, are reported by S Cocuzza (*Ann di ottal e clin ocul* 60 51 (Jan) 1932). Powdered calomel applied to the cornea brought about an inflammation of the cornea and iris followed by restoration of the normal depth of the anterior chamber and relief of pain.

From his experiments with rabbits and man, H Schmelzer (*Arch f Ophth* 127 (pts 2 and 3) 414, 1931) concludes that nervocidin is not a remedy for glaucoma. However, it is useful as an analgesic and anesthetic.

S Werner (*Acta ophth* 9 275, 1931) concludes that the effect of subcutaneous injections of **gynergen** on the intraocular tension in glaucoma is negligible.

Retrobulbar injections of alcohol are employed by J Fejer (*Am J Ophth* 15 135 (Feb) 1932) in treating painful absolute glaucoma and other painful eye diseases. He injects 1 cc (16 minims) of 80 per cent alcohol near the posterior pole of the eyeball 5 minutes after having injected novocaine into the same area. The alcohol produces anesthesia and immobility of the eyeball. Exophthalmos and chemosis, which often follow, disappear after a few days. Fejer reports 5 cases with recurrence of pain in 2 cases. This was due to the presence of an intraocular melanosarcoma in 1 case and bone formation in the other.

Surgical Treatment.—A case in which an abnormally large lens in each eye produced bilateral juvenile glaucoma is reported by E Kunz (*Klin Monatsbl f Augenh.* 87.433 (Oct) 1931). Iridectomy was performed on both

eyes and tension was reduced by the use of pilocarpine. He believes that the circumlental space was probably so narrow that it prevented sufficient efflux from the vitreous

J S Friedenwald (Am J Ophth 15 189 (Mar) 1932) calls attention to the fact that operations which empty the anterior chamber suddenly result in a congestion of the ciliary body. This congestion resembles that which is found in acute glaucoma. To combat this reaction, he advocates the retrobulbar injection of epinephrine solution preoperatively as follows. One per cent novocaine (with 0.2 to 0.3 cc—3 to 5 minims—of a 1:1000 solution of epinephrine) is injected into the retrobulbar space, between the inferior rectus and the external rectus muscles. This is accomplished by means of a long fine needle inserted through the lower eyelid near the inferior temporal angle of the orbital margin.

A modification of Holth's iridencleisis for glaucoma has yielded excellent results. After dissecting up a conjunctival flap, D Diaz Dominguez (Arch de oftal. hispan-am 32:319 (June) 1932) makes a scleral section with a Graefe knife, cutting layer by layer, deliberately irregular. He finally makes an iridotomy at the base. His findings are based on 22 eyes operated on by this method.

GLUCOSE.—UNTOWARD EFFECTS.—W S McClellan and H. S H Wardlaw (J. Clin Investigation 11: 513 (May) 1932) made observations of the respiratory metabolism of a patient who upon 3 different occasions developed symptoms of hypoglycemia about $4\frac{1}{2}$ hours after the ingestion of 100 cc. ($3\frac{1}{8}$ ounces) of glucose. In this case, a depression of the blood

sugar to the level that resulted in symptoms occurred twice as a result of excessive oxidation of carbohydrate, and once as a result of excessive storage. The blood sugar time curves of 5 patients were studied and wide variations were found, which developed largely on the diet which the individuals had previously received. The authors believe that the interpretation of every blood sugar time curve should be based on a knowledge of the previous diet.

ABSORPTION.—Considerable difference of opinion exists among investigators as to whether glucose in appreciable amounts can be absorbed from the large bowel. W W Ebeling (Am J M Sc 183 876 (June) 1932) made a study of glucose absorption from the intestinal tract of the normal, pancreatectomized and the insulinized dog, in which study certain factors were controlled which had previously not been taken into consideration. Glucose solutions were found to be absorbed at a very slow rate when placed in the entire colon of the dog. Hypertonic solutions (10 per cent) are absorbed very little faster than were isotonic solutions. When a marked glucose deficit occurs in the blood, according to the author, glucose can be absorbed from the colon approximately as rapidly as it can from a low ileal loop of the noninsulinized dog. The presence of glucose in the solution in the colon causes a retardation in the rate of water absorption. The total amount of glucose which can be administered and absorbed from the colon under the very best conditions would appear, from this investigation, to be too small for any considerable therapeutic effect.

E L. Scott and J F B Zwieghaft (Arch Int Med 49 221 (Feb.) 1932) were unable to demonstrate a rise in the

blood sugar curve as a result of administering glucose in retention enema. The slight drop that their curve shows may be due to a stimulation of pancreatic activity brought about by the absorption of a slight amount of glucose, or, more probably, to chance variation. A variable and frequently considerable amount of glucose administered by enema may be recovered from the stools after 2½ hours.

GLYCOSURIA.—Sugar in the urine at all times should be investigated promptly and thoroughly so that no case of true diabetes will escape the advantages of early treatment, or a case of renal glycosuria be incorrectly treated with diet and insulin.

GLYCOSURIA OF PREGNANCY—L A Chase (Canad M A J 26 279 (Mar) 1932) reports her observations on the urine of pregnant women. She found in examining 100 specimens of urine that 66 per cent of these showed sugar and in 1 patient in whom 100 examinations of urine were made 4 times a day for 25 days, 47 per cent of the specimens showed sugar, most often in the afternoon; rarely in the morning. The fasting blood sugar in this case was normal. In another series of cases she found that the glycosuria was present in the majority of cases at some time after the second month of pregnancy. If it was not present, it could be easily induced by the feeding of extra sugar in the diet. Sugar tolerance curves in these cases were those typical of renal glycosuria. After delivery, the glycosuria disappeared quickly in practically all these cases. Those in which there was some delay in the disappearance have been examined since and definitely ruled out as true diabetics. (This type of glyco-

suria, as well as renal glycosuria, of course, requires no treatment but frequent observations, and the diagnosis of renal glycosuria should be made only after observations over a period of 2 or 3 years.)

V J Harding and D L Selby (Canad M A J 26 283 (Mar) 1932), discussing the same subject, feel that the incidence of *renal glycosuria* may be as high as 100 per cent in normal pregnancies and that the factors determining its presence are the diet of the patient, the volume of urine passed, and the time at which the specimen is obtained in relation to a previous meal. The question of diagnosing renal diabetes from diabetes mellitus is somewhat of a problem for the man who does not have ready laboratory aid to help him. (In the majority of cases this can be done by observing that the amount of sugar secreted in a 24-hour specimen is rather independent of the diet.)

This is true to some extent of these glycosurias of pregnancy, however, they do vary a trifle in their glucose percentage. It is far safer in these cases to do a blood sugar, if at all possible, and, from a practical standpoint, a blood sugar determination made 2 hours after a meal which contains at least 50 Gm of carbohydrate, is the most satisfactory. If this figure is found to be normal, the patient is obviously not a true diabetic. Indeed, any figures below 140 mg at the 2-hour interval in the pregnant woman might be considered as normal.

It is wise to follow these cases through after pregnancy, as frequently it is found that diabetes mellitus has its inception during the period of gestation and unless these cases are carefully observed afterward, many will break down into a true diabetes. One should hesi-

tate to restrict the carbohydrates of pregnant women because of the possibility of helping to induce an eclamptic state, as recent work seems to indicate that adequate carbohydrate is necessary to overcome both the earlier and later types of toxemia)

RENAL GLYCOSURIA.—G Fanconi (quoted in *Lancet* 2 1418 (Dec 26) 1931) reviews the subject of nondiabetic glycosuria in childhood and states that he diagnoses this condition if he finds glycosuria with a normal fasting sugar and a normal blood sugar curve. He speaks of a secondary or nephrotic renal glycosuria which he feels is due to a chronic infection. The second large group of these cases are those associated with diseases of the central nervous system. He states that in chorea, too, a fair number of cases that show glycosuria may be found.

He discusses the blood sugar reading in various endocrine disorders. He also reports that in several cases of acetoneuria, vomiting and cyclic vomiting, the blood sugar has been found to be increased, which is not a constant finding in this condition. This raises the point as to whether or not these cases should be treated with insulin. With the introduction of the newer methods of micro-sugar determinations, it is relatively easy to collect sufficient blood to determine its sugar content from children of any age, and as it may be expected that the frequency of diabetes in children will markedly increase during the next few decades, it is wise to rule out in any case, by blood studies, those cases showing glycosuria.

GOITER.—TREATMENT.—A H Williams (*Radiology* 18 553 (Mar) 1932) reports the result of x-ray treatment in 200 cases of goiter. The pa-

tients averaged 10 treatments over a period of 3½ months. The average drop in pulse was 24.2 beats, average gain in weight, 8 pounds (3.6 Kg), and lowering in metabolic rate, 23 points. One hundred and sixty-one patients (80.5 per cent) were definitely cured, while 27 (13.5 per cent) were improved, making a total of 188 (94 per cent) either cured or improved. Eight (4 per cent) recurred after 1 year, 5 of which were later retreated and cured. Only 2 patients (1 per cent) developed subthyroid symptoms, and 1 case (0.5 per cent) showed telangiectases.

GOLD.—UNTOWARD EFFECTS.—On the basis of their own experience, B. Throne, J. Kingsbury and C. N. Meyers (*Arch Dermat and Syph* 25 494 (Mar) 1932) call attention to the fact that all gold compounds are toxic, some being more so than others. Their use is attended with danger, but this danger can be minimized by the following procedure.

1. The patient should be examined for focal infections, and such foci should be removed before instituting therapy with gold compounds.

2. A preliminary analysis of the blood should be made. (a) a high sugar and low chloride content means a physiologic dysfunction. This should be eliminated by a preliminary course of injections of a freshly prepared solution of sodium thiosulphate; (b) in cases showing a high blood sugar content not associated with pancreatic deficiency or metallic retention, the doses of the gold compound should be comparatively small. On the other hand, patients with definite diabetes mellitus seem to tolerate treatment with gold preparations.

3 The first sign of intolerance, as manifested by dryness of the mouth and pruritus, is an indication for discontinuance of the gold compound and the use of sodium thiosulphate. In the authors' experience, these symptoms are invariably accompanied by an increase of the blood sugar, a decrease in the chlorides and frequently a marked decrease in the urea nitrogen.

4 Chemical examination of the blood at weekly intervals, by showing an increase in the sugar and a decrease in the chloride and urea nitrogen content, frequently enables the clinician to foresee an intolerance to gold compounds and, by instituting proper eliminative treatment at once, to prevent reactions.

5 It is impossible to determine previously the tolerated dose for each patient. The initial dose should be small, not exceeding 25 mg ($\frac{1}{8}$ grain) of the gold preparation. This dose can be gradually increased if it is well borne and is not effective, but it should be kept low as long as it shows a beneficial action on the lesions.

GONORRHEA. — COMPLICATIONS—Cutler (Internat J Med and Surg 45 359 (Aug) 1932) reports two very interesting cases of *pyelitis* complicating gonorrhea, both in males. In the first case he was not able to isolate the gonococcus from the urine of the infected kidney but obtained the *colon bacillus*. In the second case no attempt was made to isolate the gonococcus from the urine. These 2 cases were, no doubt, not due themselves to the Neisserian infection, but occurred as a result of the obstruction in the lower urinary tract by the pathological changes which were there due to the gonococcus.

One of the most common complica-

tions of gonorrhea is *painful heel*. F Liberson (J Urol 28 105 (July) 1932) reports 31 cases of gonorrheal periostitis or spurs in the heel which have been treated by the x-ray. He believes that this treatment, combined with general measures to eradicate the source of the gonorrheal infection, will have a more permanent result than any other form of treatment heretofore attempted. In a series of 31 cases, only 2 were not considered good end-results.

PROPHYLAXIS AND TREATMENT—The treatment of gonorrhea comes in for considerable discussion in the literature during the past year.

R D Herrold (Urol and Cutan Rev 36 441 (July) 1932), in a timely article, considers that the *prophylactic treatment* of the disease is valuable from the standpoint of public health. He emphasizes the immediate use of soap and water after exposure and then advocates the injection of a heavy soap emulsion in the meatus. The abortive treatment he considers proficient in from 10 to 20 per cent of the cases. In the acute anterior infections he emphasizes gentleness in the use of injections and states that local complications such as phimosis, paraphimosis, periurethral abscess or acute adenitis are contraindications for initial local treatment. In their place, he uses hot applications and oil of sandalwood by mouth. In the oral administration of antiseptics, the author uses the pyridin group and does not recommend them if there is the same contraindication against treatment from the urethral route. The problem of the administration of antiseptics by mouth is being taken up at the present time.* It is claimed that further observations are needed for a definite evaluation. Vaccine therapy, of course, is of interest in

connection with bacteriophage. Future observation may advance this method of biologic therapy. The author has found in a large series of cases that **calcium gluconate** intravenously, or alternating with the same drug intramuscularly, combined with its oral administration, has given more favorable results in acute epididymitis and in acute complications than any previous nonspecific therapy. The use of more drastic measures for nonspecific therapy would not seem justified for use in gonorrhea because of its low mortality rate. He emphasizes modern local treatment and is very favorably inclined to use mild **silver iodide** as local medication.

Gonorrhea in its relation to public health is considered by W. H. Mackinney (Pennsylvania M. J. 35: 688 (July) 1932) and he feels that the early instruction to youth in matters pertaining to sexual life is important. He emphasizes the training of the individual in the early application of *prophylaxis*, the establishment in strategic parts of the city of adequately equipped prophylactic stations; bewails the willful lacking in efficiency of the treatment of the disease, and insists that the veil of secrecy surrounding this disease shall be removed.

In a study of the various drugs used as local injections in gonorrhea H. L. Wehrbein (J. Urol. 28: 233 (Aug.) 1932) sums up his observations by remarking "All together we may say that none of the drugs examined can be called satisfactory from a purely pharmacological viewpoint. This is so much in accord with our clinical experience that we must urge the search for better antigonorrheal drugs or possibly even argue against all local treatment. If we do use local treatment, the drug employed must be harmless to

the tissues it comes in contact with; it should be bactericidal and it should assist in the response of the body to the invading organisms."

Upchurch and Upchurch (Internat. J. Med. and Surg. 45: 417 (Sept.) 1932) have little to add in their comments on the treatment of gonorrhea except to advance the thought that the future treatment of the disease will be the result of *biologic* rather than chemical research, and to stress the importance of *gentleness* in the treatment of the disease.

G. Greenberg (Urol. and Cutan. Rev. 36: 509 (Aug.) 1932) emphasizes the treatment of gonorrheal infections in the urinary tract by saying it is that of a surgical lesion anywhere in the body. Its cure depends upon perfect **drainage** and the sole attention of the urologist should be concentrated on the promotion of this drainage.

DETERMINATION OF CURE

—J. Bucher (Pennsylvania M. J. 35: 690 (July) 1932) concludes that the direct microscopic examination of urethral and prostatic smears is at the present time the best and most practical laboratory method of determining a cure in gonorrhea. The presence of pus and of gonococci should be considered as presumptive evidence of a residual infection. In women it is extremely difficult to recover the gonococcus in smears from the genital tract, although they may be infected with the disease.

GONORRHEA IN THE FEMALE.—A case is reported by N. Z. Iwanow (Urol. and Cutan. Rev. 36: 516 (Aug.) 1932) in which he believes that the gonorrheal infection penetrated into the tubes and ovaries by way of the parametrium and avoided the mucous membrane of the uterus. He considers the principal route of invasion

to be the loose connective tissue in the broad ligaments and emphasizes that the formation of the infiltrate and of all the elements in the exudate occurs at the expense of the local tissue elements in the female pelvis

DIAGNOSIS.—The unreliability of laboratory aids in the diagnosis of gonorrhea in women is emphasized by A. Jacoby (*Am J Obst and Gynec* 23 729 (May) 1932). For the diagnosis of gonorrhea in women repeated smears should be taken and carefully examined. The use of the Gram stain is not essential. In conjunction with a proper evaluation of the clinical examination, the *methylothionine chloride stain* is adequate for practical purposes. A positive smear is conclusive evidence of infection. A negative smear, even when repeated, does not exclude the presence of a gonococcal infection in women. Suspicious organisms, extracellular or intracellular, should be interpreted in accordance with the clinical evidence. Pure spreads of pus cells, even without organisms present, should be regarded as suggestive evidence of gonococcal infection. When *cultures* are taken and prove positive, they constitute conclusive criteria but are not practical or well adapted to routine practice. A negative culture does not exclude the presence of a gonococcal infection. The *complement-fixation* test for gonorrhea with the present technic is unreliable. Neither positive nor negative results are conclusive. Unless an improved technic affording more reliable results is evolved, the fixation test should not be used for the diagnosis of gonorrhea or for the control of its treatment. Even under the most favorable conditions, it is apparent that laboratory procedures are of minor importance in establishing a diagnosis of gonorrhea in women. A

wider appreciation of this fact, with a consequently greater reliance on the history and clinical evidence, will suggest the correct diagnosis in many of the now unrecognized cases of gonorrhea in women.

GRANULOCYTOPENIA.—

According to C. A. Doan (*J A M A* 99 194 (July 16) 1932), since the routine counting of the blood cells was instituted, there has been noted a tendency to leukopenia in typhoid, influenza, osteomyelitis, tuberculosis, overwhelming infection with the pneumococcus and streptococcus, certain virus diseases, pernicious anemia, aleukemic leukemia and lymphoblastomas, especially Hodgkin's disease.

Roberts and Kracke were among the first to recognize the importance of analysis of accumulated data in terms of white cell level and symptomatology. Their series of 8000 cases showed 1 of every 4 were suffering from a mild granulopenia, while complaints of weakness, exhaustion and fatigue were twice as frequent in neutropenic individuals as those with normal counts. The severity of the symptoms was found to parallel to a marked degree the level of the blood cell count.

A new impetus was given to these studies by the work of Schultz, in 1922, with his description of angina agranulocytica, which included progressive oral sepsis, marked prostration and a neutropenia. Most observers explain this blood picture in the symptom complex as secondary to a septic or toxic process affecting an aplasia of the myeloid cells in the marrow. Two observations which seem to refute this opinion are the following: (1) the neutropenia may be periodic and definitely precede the appearance of local signs of infection; and

(2) biopsy and postmortem studies are revealing the fact that not in every case of peripheral leukopenia is the bone-marrow aplastic for myeloid elements. Fitz-Hugh and Krumbhaar have termed the process a maturation arrest or pernicious leukopenia.

To approach any discussion on the problem, it is necessary to conceive of the cells of the blood as a tissue, with the capabilities of hypertrophy, atrophy and functional insufficiency the same as any other organ. The association of nucleic acid physiologically produced constantly in the body and the leukopoietic system was restudied and following this, in 1928, on purely empirical grounds, nuclein therapy was suggested to increase the germicidal power of the blood in diseases of microbic origin. The phagocytic power of the polymorphonuclear leukocyte was next studied, but the value of nucleic acid therapy failed at this time to receive the credit it actually deserved.

It is now known that the increase in leukocytes attributed to nucleic acid in the earlier work was well within the physiologic fluctuation limits and not of sufficient magnitude to influence any pathologic process. Pentose nucleotides were next found in the normal human blood and pure crystals of adenylic and guanylic acids were administered to laboratory animals and found to produce an immediate neutrophilic response without the preceding leukopenia. In 1931, Jackson reported a series of 20 clinical cases of profound leukopenia with recovery in 14 following large doses of the nucleotide.

The experimental work of Doan on rabbits justified the following conclusions. (1) nucleic acid and its degradation products exert a chemotactic effect on normal myeloid foci, with a

prompt effective increase in the delivery of granular leukocytes to the peripheral circulation under a controlled physiologic or rhythmic mechanism. (2) Repeated large intravenous injections tend neither to exhaust nor to cause a malignant hyperplasia of the myeloid elements in the normal animals. (3) A short course of injections stimulates a myeloid hyperplasia of normal marrow without otherwise injurious consequences, which is reflected by a relative and absolute increase in the amphophilic granulocytes in the blood stream of rabbits.

Clinical studies have revealed, according to Doan, 2 states or conditions: (1) the acute or chronic neutropenia, and (2) the malignant neutropenia. In the chronic form, the symptoms are vague and very few signs, other than the leukopenia itself, are present. It is important to study thoroughly these cases, since some normal individuals present a white count of 2500 to 5000 and have a definite and prompt response in the granular leukocytes in the presence of infections of the acute type.

In a second group of patients with chronic leukopenia, there is usually somewhat less of the normal feeling of well being. Loss of energy, an ease of fatigability, a relative lymphocytosis, with an absolute neutropenia, are usually observed. Such patients, when studied by the epinephrin test and by single injections of nucleotide, present a bone-marrow capable of a definite but minimal response, with imminent possibilities of grave and serious insufficiency. These cases have been followed for the past 2 years and have shown no progressive tendency to an insufficiency of the bone-marrow.

To the author it is the acute or malignant form of neutropenia, with its sud-

den onset and rapid course, which presents a challenge to the physician for the bending of his greatest efforts for immediate recognition and adequate therapy. This symptom complex may be separated from the other neutropenic states, (1) by a carefully taken history which may reveal vague symptoms of fatigue and weakness preceding any signs of infection, thus marking the neutropenia as primary, (2) by the rapid malignant spread of what would ordinarily prove to be a minor infection of the mouth; (3) by the severity of the general prostration and malaise and by a degree of apprehension out of all proportion to the extent or duration of infection or of the pathogenicity of the organisms found, and (4) perhaps, by the therapeutic test to be described later. Under such circumstances the bone-marrow may be either hyperplastic or relatively aplastic for myeloid elements in patients presenting this syndrome.

TREATMENT.—Many therapeutic measures have been suggested and tried to prevent the rapidly fatal termination of the case which is deprived of his chief cellular defense mechanism, the neutrophilic leukocyte. Because of the lack of knowledge on the subject, empiricism rather than therapeutic rationale has governed most of the suggestions.

The 3 measures which have given the most promise are irradiation, blood transfusion or some form of nucleic acid. Since the latter substance has proven of considerable value, it is reasonable to assume that more gratifying results may be anticipated from this form of therapy than from some more indirect methods of approach which have been suggested.

The nucleotide substances have been found in the normal circulating blood

and the circulating neutrophilic leukocytes circulating in the blood will yield nucleic acid on disintegration. Thus, the transfusion of such blood in many instances will stimulate and return the normal mechanism of cell delivery once more. The only disadvantage of such a procedure is the small concentration of effective stimulus per unit volume of blood which may be introduced into the patient from the donor.

There are differences of opinion regarding the primary effect of minimal exposure to x-rays and radium. The fact that the hemopoietic tissues are highly radiosensitive and may inadvertently be destroyed by a variable exposure to such active rays, necessitates the careful administration of such a measure as it is really a two-edged sword. The fact that a number of cases treated by repeated $\frac{1}{20}$ erythema doses have shown a quick response, only to be followed by a fatal relapse, seems to illustrate to the author the effect of a potentially destructive agent when a marked grade of myeloid hypoplasia exists as a basis for the neutropenia.

It is too early in the stage of observation to properly evaluate the relative merits of each form of therapy, but if the nucleotide is a specific stimulus to myelopoiesis, the most effective therapeutic rationale should include its attempted replacement in a concentrated form.

Too much attention cannot be paid to the question of focal infection. The mouth is most frequently affected, as there is a predominance of the *fusiform bacillus* and *spirilla* of Vincent. Meticulous care should be used in attending all these oropharyngeal infections during the stage of lowered resistance and leukopenia. Apical abscesses, otitis media, rectal abscess, and infected sin-

uses have all been found as complicating factors in these cases and all measures to prevent their progression and limit their activity are indicated

GRANULOMA INGUINALE.

—TREATMENT.—H H Hazen, W J Howard, C W Freeman and R H Scull (J A M A 99 1410 (Oct 22) 1932) discuss the treatment of granuloma inguinale in the negro. Among 900 new dermatologic patients entered at the Freedman's Hospital Clinic, Washington, D C, there were 9 cases of granuloma inguinale or 1 per cent. That this disease shows a predilection to the negro is well established.

In the authors' series this condition was associated with the labia minora primarily, involving the labia majora secondarily either by hyperplasia and destruction or by an intractable edema.

The Donovan bodies were demonstrated in two-thirds of the cases. The duration of the disease ranged from 6 months to 5 years.

The treatment used was varied. Three patients received x-rays, 3 antimony and potassium tartrate in ampoules, and 3 received injections of

antimony thioglycollamide. The latter drug was favorably reported by F E Senear and E Cornbleet (Arch Dermat and Syph 25 167 (Jan) 1932).

The irradiated patients received one-fourth unit dose of an unfiltered ray with a peak voltage of 100, at weekly intervals, and all were improved after 4 exposures and completely healed after 9 exposures.

The 3 patients receiving a 1 per cent tartar emetic solution freshly prepared, beginning with 5 cc (1¼ drams) and increasing by 1 cc (16 minims) up to 10 cc (2½ drams), gave signs of improvement after a few injections. The disadvantage of this treatment was the malaise and nausea following the injections.

Antimony thioglycollamide produced striking therapeutic results with no complaints. Injection of 20 cc (5 drams) of a 0.4 per cent solution caused relief in 1 day in 1 patient.

The authors believe that the most certain results are obtained by the injections of a freshly prepared solution of tartar emetic or injections of antimony thioglycollamide.

H

HEAD INJURIES.—PATHOL-

OGY.—The pathology of head injuries is still not definitely settled. In the cases of concussion that die, nothing may be found microscopically. In the severer forms of concussion or contusion petechial hemorrhages may be seen in the cortex. The brain may be lacerated, and edema is a very frequent finding. The perivascular and pericellular spaces are edematous, the brain is wet, changes may be noted in the choroid plexus and

ependymal cells of the ventricles. The choroid plexus shows vacuolization. The ependymal cells show an increase in length with edema. An increase in perivascular and pericellular spaces in the cortex may be seen.

Cerebral injuries are characterized by injury to the skull or calvarium and the cranial contents, cerebrum, cerebellum or medulla. *Injuries to the skull* may be divided into depressed fractures, simple or compound, linear fractures of

the vault, and fractures of the base As to the incidence of fractures of the vault and base, C P Symonds (Lancet 1 820 (Apr 16) 1932) states that about 90 per cent occur in the base and 1 per cent. in the vault Cerebral injuries may be divided into concussion, contusion, laceration of brain, and hemorrhage of the middle meningeal artery, which may be extradural or subdural *Concussion* is the simplest form of injury to the brain characterized by an immediate, generalized loss of consciousness *Contusion* is a more severe type of injury characterized by being progressive and a tendency for localization *Etiology* of head injuries is well known At present the automobile has increased the cause of head injuries over 300 per cent Injuries may also be due to falls, blows, bullets, aeroplanes, etc.

COMPLICATIONS.—The complications of craniocerebral injuries may be septic meningitis, brain abscess, epilepsy and post-traumatic neurosis or psychosis. Traumatism of frontal and temporal regions and their relation to *meningitis* are discussed by W P Eagleton (New York State J Med 32 947 (Aug 15) 1932) who emphasizes the following points: (1) the limitation of surgery in all cerebral injuries, whether accompanied by a skull fracture or not, to the prevention of sepsis and the relief of compression; (2) the diagnostic importance of consciousness and unconsciousness in injuries of the frontal and temporal bony regions If unconsciousness is present, the importance of ascertaining whether there has been a free interval, even if it was only a short one; (3) how to diagnose clinically, while the patient is in good condition, the deceptive cases of linear fracture of the frontal bone that are apt to develop

meningitis, (4) the conversion of compound but hidden fractures of the frontal sinus with a tear in the dura into simple fractures, (5) the value of lumbar puncture for the removal of blood from the cerebrospinal fluid in injuries of the brain, (6) the value of the turning reactions in determining whether or not the brain has been damaged by an apparently trivial head injury

As a result of his studies, E D Friedman (Arch Neurol and Psychiat 27·791 (Apr) 1932) has been led to revise his conception of the so-called *traumatic neuroses* following serious injury to the skull On the basis of accumulating experience, it may be said that, at least in some of the cases of "traumatic neurosis," definite organic changes that can be visualized in the encephalogram have been brought to light In this field of medicine, in which diagnosis is frequently difficult, it becomes the duty of the clinician to employ every means at his command in order to arrive at a correct interpretation of the patient's symptom complex Encephalography offers a valuable means of differentiating between organic and functional syndromes

E C Smith (Laryngoscope 42 108 (Feb) 1932) reports 3 cases of *acute mastoiditis* developing after basal skull fracture, all of which terminated fatally Complications were found in all 3 cases In one case there was an extradural abscess and 2 brain abscesses In the second case there was a subperiosteal abscess, perisinus abscess and sinus thrombosis The third patient had erysipelas, subperiosteal abscess, and perisinus and extradural abscess The cause of death was meningitis in 2 of the cases and septicemia in the other one The author calls attention to the fact that in mastoiditis following fracture

the mortality is high and complications are common, principally because of the presence of infection with an open pathway to the meninges. The best chance for success would seem to be in early diagnosis and early surgical intervention. Acute mastoiditis is a delayed complication of basal fractures, and the signs and symptoms are similar to those of acute mastoiditis from other causes. Patients with head injuries should have an ear examination as soon after the time of the injury as possible, and the ears should be closely watched thereafter.

E. S. Gurdjian and H. K. Shawan (Ann Surg 95 27 (Jan) 1932) report that the incidence of *frontal sinus fractures* in a series of more than 2600 cases of skull fracture was around 5 per cent. The majority of sinus fracture cases are asymptomatic. The patients should be confined to bed for a period of 8 to 10 days at least. They should not be permitted to blow the nose. Intranasal douches are contraindicated. The patient should be watched for infection in the sinus and suppuration within the cranial cavity. Compound fractures in this situation should be operated on as soon as the condition of the patient permits. The posterior wall of the sinus should be inspected. The great majority of frontal sinus fractures should be left alone. The results with conservative treatment are gratifying. The incidence of meningitis in the authors' series was 0.8 per cent.

In discussing *osteomyelitis of the skull* originating in the temporal bone, A. O. Wilensky (Arch. Otolaryng 16. 160 (Aug) 1932) includes 3 groups: (1) cases that occur after and as a result of trauma, (2) hematogenous cases of osteomyelitis, and (3) extension cases which complicate acute and chronic in-

flammatory disease beginning in the middle ear or in other parts of the otologic apparatus. The sequence of events in osteomyelitis of the skull of otologic origin is exactly like that in osteomyelitis of the skull complicating nasal accessory sinus disease. Both of these sets of organs are hollow chambers lined by mucous membrane and subject to the same type of infection produced in similar ways; indeed, in many cases there is "pansinusitis," this term including an infection of all the accessory structures which communicate with the nasopharynx.

The relative sparsity of cases of cranial osteomyelitis of an otologic origin is explained by the relatively efficient way in which the area of primary infection—middle ear and mastoid—is walled off from connection with the general cranial diploe and by the relative sparsity of diploe in that part of the skull immediately adjacent to the primary area. X-ray evidence is demonstrable with lesions in the vault. Lesions at the base of the skull, no matter what their x-ray morphology may be, are not demonstrable at all or are demonstrable with extreme difficulty. Intracranial complications occur in accordance with the following mechanism: (1) by contact because of contiguity of structure, (2) by vascular and lymphatic connections, and (3) during contact with secondary focus, usually a discrete extradural abscess separated at a distance from the region of the main focus of cranial osteomyelitis.

The *pathogenesis* and *clinical aspects* of *traumatic injuries* of the *internal ear* are discussed by M. Goerke (Ztschr. f. Laryng Rhin (teil 1: Folia otolaryng) 20 363 (Mar) 1931). Goerke differentiates between direct and indirect injuries of the internal ear, accord-

ing to the manner of attack of the force which causes the trauma. Aside from gunshot injuries during the war, direct injuries of the internal ear are rare. Of the *indirect injuries*, those that occur in fractures of the base of the skull are discussed first. Especially dangerous for the internal ear are *transverse fractures*. The peculiar brittleness of the petrous portion of the temporal bone is the cause of the development of small fissures in the labyrinth even when the line of fracture does not involve the aural region. Recent observations have proved that such fissures are much more frequent than is generally believed. However, in many cases they are so small that only microscopic examination will reveal them. These fissures may sometimes be the starting point of a late meningitis. The interval between the formation of the fissures and the manifestation of the meningitis may be of considerable length (the longest interval known is 210 days). In cases of otogenic meningitis, in which the anamnesis reveals a cranial trauma even several months before the meningitis, a causal relationship cannot be denied. Fissures may also cause an ossifying periostitis, which may lead to an obliteration of the labyrinthine spaces and to increasing deafness.

Another group of lesions of the internal ear are those designated as *commotio labyrinthi*, they are caused by a dull blow on the head or by a fall. In these cases the relation between the trauma and the injury of the internal ear is more difficult to recognize than in the traumas previously mentioned. In regard to the nature of the changes in *commotio labyrinthi*, it is stated that the former theories, which assumed intralabyrinthine hemorrhages, distortions, misplacements and tearing of the soft

parts of the labyrinth, have been largely disproved and that more recent investigations have revealed that the changes in *commotio labyrinthi* are, on the one hand, vascular changes such as marked distention of the vessels, diapedesis of the leukocytes and their perivascular accumulation and, on the other hand, pronounced degenerative changes in the cells of the nuclei of the acoustic nerve.

The author further discusses *labyrinthine lesions*, in which, although the cranium is not directly affected by the trauma, the influence on the auditory organ cannot be denied. In the majority of these cases the injury of the internal ear is produced by less severe but by continuously acting influences. Nevertheless, there are also cases on record in which one single loud tone or noise has caused an auditory disturbance. Investigations have revealed that the injuries caused by impacts of air are due to changes in the nervous apparatus, but opinions still differ as to how these changes develop. Some observations revealed that if the physiologic conduction of sound was interrupted, injuries in the internal ear did not develop. This would justify closure of the ears with cotton or wax in workers obliged to work in noisy surroundings.

However, others observed that among soldiers who operated heavy artillery guns, and who had closed their ears with cotton, auditory disturbances were more frequent than among those who had not taken these protective measures. The author thinks that a blast may reach the ear by 3 routes: the aerotympanal, the osteotympanal and the ossal. If the influence is only acoustic, the physiologic route is taken, however, in case of a concussion the ossal route is used. The author believes that the fact that some ears are injured by noise more

easily than are others is due to the condition of the ear. A diseased ear is more likely to be injured by a noise than one that is healthy, and it is also probable that constitutional factors create a predisposition. Of course, even healthy ears may be injured by continued noises, but the changes that develop are generally reversible, provided that periods of rest are introduced which make it possible for the ear to recover from the strain.

In discussing *ear complications* in acute craniocerebral injuries, E. S. Gurdjian (Radiology 18:74 (Jan) 1932) emphasizes the fact that aural bleeding is a serious accompaniment. The treatment is conservative in cases both with bleeding and with cerebrospinal fluid discharge. The ear should be left alone if it has stopped bleeding. Unnecessary examination may cause the introduction of infection. In cases in which there is still some discharge, the external ear should be carefully cleansed, the wall of the external auditory canal painted with 4 per cent iodine solution, and a mastoid dressing applied either with no packing of the canal or with very loose packing. As long as the patient does not complain of earache and there are no unexplainable clinical manifestations, the less done to the patient, the better the results. A total of 476 cases of aural bleeding or cerebrospinal fluid leakage from the ear are reported by the author. The right ear was involved in 36.5 per cent. of the total group, and the left ear, in 43.1 per cent., there was bilateral bleeding in 20.6 per cent. of the cases. In the group examined by x-ray, positive observations in cases with unilateral bleeding were 93 per cent., and in cases with bilateral bleeding, 98 per cent. Otitis media was found in 9 cases, meningitis

in 4, and mastoiditis in 3. The mortality was 37.1 per cent. with right-sided, aural discharge, 38.5 per cent. with left-sided, and 67.3 per cent. with bilateral discharge.

Among the several varieties of *headaches* encountered in persons following injuries of the brain, C. P. Symonds (Lancet 1:820 (Apr 16) 1932) distinguishes 3 groups. The first is that complained of by the patient in terms of discomfort rather than pain—a continuous sense of numbness or pressure, aggravated by all kinds of mental stimuli whether internal (*e.g.*, worry over incapacity) or external (noise, bright light). This is the kind of headache present in psychogenic states, but also in certain psychoses (for instance, the toxic group and the depressive) and may be considered as one of the reflections in consciousness of general cerebral incapacity. A second variety, often associated with the first, is equally frequent and of a quite different character. It is complained of as throbbing, piercing or aching, is localized rather than diffuse, occurs in bouts, usually of brief duration, and is aggravated by the change of posture and physical effort as well as by mental stimuli. This kind of headache is often referred to the situation of the initial injury and is sometimes associated with superficial tenderness. Its character and relation to postural change and effort indicate dependence on some local physical cause, and this may be found in the shape of loculation in the subarachnoid mesh or ventricular system. A third and relatively uncommon variety of post-traumatic headache is that which appears in bouts of considerable duration and severity, and has the bursting quality and association with vomiting which suggests a hydrocephalic state.

A bout of this kind may be provoked by alcoholic excess or by a severe physical effort. The liability may remain for a short time only after the injury or, as so often happens, may persist indefinitely. If the lines of clinical distinction between these varieties of headache prove to be valid, they will serve as guides to differential treatment. The "*psychogenic*" type of headache will be amenable only to general measures of cerebral rest, including the removal, when present, of litigation worries. The *intermittent, localized variety* of headache, *related to change of posture*, may prove amenable to relief by air injection or in severe cases by operation. The rarer *hydrocephalic form* invites treatment by repeated lumbar puncture.

DIAGNOSIS.—The diagnosis of the different types of injury is very important from the therapeutic standpoint. Kirshbaum (Illinois Med J 60:338 (Oct) 1931) thinks that there has not been sufficient attention given to the careful examination both on admission and the following 12 to 24 hours after entrance into the hospital. Very frequently when a patient is sent to the hospital with a head injury the first thing the doctor is concerned with is, "Is there a skull fracture evident?" The patient is then hurriedly sent to the x-ray department. Many a patient has been killed, or at least his death has been hastened in this way by the carelessness of the doctor, and the roentgenologist indirectly. Injuries to the skull alone never produce serious trouble unless the fracture is a depressed one, and so, of what advantage is the x-ray if it does reveal a linear fracture of 5 or 6 inches long, unless from a medicolegal standpoint? The examination of the patient will reveal immediately the type or in-

tensity of a head injury. The symptoms of most concern are

1 Pulse—is it rapid and thready as in shock, or is it slow and irregular? Usually below 70 is indicative of increased intracranial pressure.

2 Respiration—very slow and irregular (Cheyne-Stokes) as in intracranial pressure, or very rapid as in shock.

3 Temperature—as the intracranial pressure increases, the temperature rises and when above 102° F (38.9° C), it is a grave sign.

4 Blood-pressure—this should be recorded every half hour, for the first few hours, and then every hour, because it is of great diagnostic help. If the patient is admitted in shock the blood-pressure will be subnormal, but as the intracranial pressure increases, the blood-pressure rises until medullary compression occurs, when it begins to fall.

Concussion, which is the simplest form of brain injury, is characterized by an immediate generalized unconsciousness from which the patient may or may not be aroused, this varies from a stuporous condition to coma, and is usually followed by dizziness and headache. This may soon be followed by nausea or vomiting and some disorientation. There may or may not be a skull fracture present. There is very little rise in the intracranial pressure. Recovery may follow after a brief interval; this is often seen in boxers and is frequently known as "punch drunk." Deep reflexes may be lost or diminished.

If the injury is severe, *i.e.*, *basal skull fracture*, there may be associated with it concussion, contusion, or laceration of the brain. Such an injury is diagnosed by bleeding from the ears, nose or mouth. There may be an escape of spinal fluid from the ears or from a wound in the skull. Ecchymosis of the

eye or mastoid swelling may be present. As the intracranial pressure increases, edema of the brain becomes more intense. This may be detected early by the measurement of the spinal fluid by the *mercury manometer*. Normally, it is up to 12 mm, and when over 30 mm, this is a dangerous sign. Of next greatest diagnostic value to the mercury manometer for determining increased intracranial pressure, is the *ophthalmoscopic examination* of the fundi. In the first 5 to 6 hours following an injury, no changes may be noted in the fundi, but soon dilatation of the veins of the retina and a blurring or haziness of the margins of the discs may be noted. As the pressure increases, the disc becomes hyperemic and edema appears over the nasal half of the disc. Choked discs appear very late and it is a terminal finding. The deep reflexes are usually absent or diminished. Localizing signs should be noted, *i e*, paralysis of a leg or arm, or facial involvement. Unilateral dilatation of a pupil usually denotes a cerebral hemorrhage on the same side as the dilatation. Dilated fixed pupils are a poor prognostic sign; constricted fixed pupils are usually due to hemorrhage of the pons and medullar compression.

Middle meningeal hemorrhage results from tearing of the vessel following skull fractures. It does not occur as frequently in children because of the ability of the skull to mold itself. A hemorrhage may be extradural or subdural. The amount of blood escaped is responsible for the death of a patient; it is the degree of compression and edema of the brain. Usually, as the hemorrhage spreads, focal signs may be elicited, *i e*, paralysis of an arm, leg, or of the face, increased reflexes on the same side; and, finally, convulsions.

The history of a lucid interval of consciousness, followed in a few hours by unconsciousness, is usually diagnostic of middle meningeal hemorrhage.

MEDICOLEGAL ASPECTS.—

From an otologic point of view, W. E. Grove (*Ann Otol Rhin and Laryng.* 60 222 (Mar) 1931) considers the head injuries in 4 groups: (1) injury of the brain with vestibular symptoms, but no deafness; (2) injury of the brain with injury of the inner ear and deafness; (3) injury of the brain and of the inner ear by a fracture of the temporal bone, and, lastly (4) injury of the eighth nerve. Grove carefully goes into the importance of the symptomatology, history-taking and examination in establishing these facts. There is no question in the author's mind that the estimation of the hearing defect is not difficult, but with respect to the vertigo, the matter is not so simple. The estimation of disability because of traumatic vertigo rests upon a number of different factors such as the frequency and duration, the patient's age, occupation, etc., and even then, Grove believes that the entire matter is more or less arbitrary guesswork based on a large experience.

APPRAISAL OF HEAD INJURIES.—A most comprehensive program of the appraisal of disability in such cases is proposed by F. Kennedy and S. B. Wortis (*J A M A* 98 1352 (Apr 16) 1932) for the reason that the remote symptoms of head injuries have become, of late, matters of medical, sociological, economic and medicolegal concern. It should be stated that only a small minority of patients who have had head injuries, including skull fracture, return to the physician later with any complaints. The physician must try to harmonize the known, the degree of injury, the subse-

quent history of the patient's symptoms and his physical, especially neurologic, condition. Dissonance in this trilogy, according to the authors, must be viewed askance and arouse suspicion of a suggestion neurosis. They propose the following plan to determine the degree of disability dependent on structural neural injury, all of which units are actually measurable and factual in establishing evidence of brain injury.

(a) Absolute criteria

- 1 X-ray evidence of skull fracture
2. Bloody spinal fluid
- 3 Bleeding or cerebral spinal fluid leakage, especially from the ears.
4. Focal cerebral palsies

(b) Presumptive criteria in order of importance

- 5 Convulsive states, *proved* post-traumatic
- 6 Ventricular distortion *proved* post-traumatic
- 7 History of prolonged unconsciousness
- 8 History of adequate trauma

The absolute criteria plus 7 and 8 of the presumptive criteria can be accurately determined. Headache and dizziness on the other hand are unmeasurable factors following head injury, and should they persist for more than 4 months in a person under 60 ununited to any of the first 7 premises of brain or meningeal injury, it may be presumed that they arise not from structural neural change, but from the adoption of an idea in agreement with an already established emotional trend, of such are the suggestion neuroses.

HEADACHE.—ETIOLOGY AND TREATMENT—The association between lesions of the cervical sympathetic ganglia and pain in the head

has been demonstrated experimentally by L Davis and L J Pollock (Arch Neurol and Psychiat 27 282 (Feb) 1932). This seems to afford the physiologic basis for the success in the treatment of migraine reported by W E Dandy (Bull Johns Hopkins Hosp 48 357 (June) 1931), who removed the inferior sympathetic ganglion in 2 cases, obtaining good results in each instance.

MIGRAINE.—DEFINITION—

Migraine is a condition defined as a pain beginning on one side of the head and frequently termed "sick headache," since nausea and vomiting may accompany it. The attacks come on periodically, but with more or less regularity. As a matter of fact, this is not a distinct entity, but rather a syndrome, according to O T Osborne (Ann Int Med 6 691 (Nov) 1932). At times it has been looked upon as a neurosis, and it is noteworthy that people with a neurotic tendency are more likely to have this kind of headache than are phlegmatic persons.

ETIOLOGY.—The results of a long and detailed study regarding the etiological factors of migraine are discussed in a brilliant paper by O T Osborne. This writer agrees with Balyeat and Rinkel who believe that the cyclic vomiting of young children is a migraine symptom. Furthermore, those afflicted with migraine often suffer attacks less frequently or may be entirely freed after 45 years of age. Osborne attributes the cessation of migraine at this time of life to presbyopia and the consequent use of eye glasses for the relief of eyestrain. In 45 years of practice, the author states that he has never seen a case of typical migraine without optic defect and consequent eyestrain as a cause.

While migraine is looked upon as *hereditary*, it is only the neurotic tendency and defective eyes that are handed down in families. The type of eye inherited is astigmatic, frequently associated with hypermetropia, and these defects cause eyestrain and consequent headaches. It is apt to begin in early childhood, particularly when the child first goes to school.

Overeating, indigestion, constipation, hyperexcitability, increased thyroid secretion, fever, menstrual disorders, excitement, and numerous other factors may produce a headache in these individuals. But the reason why the pain occurs more often on one side than on the other is because the eye on that side is more defective, and consequently there is a greater strain of the eye muscles on that side.

There is also a great tendency to *periodicity*, possibly from coincidental pituitary disorders. This may be so imbedded in the constitution of the patient that no matter what is done toward correcting the eye defect, recurrences of the migraine will take place. Therefore, the sooner in life the eye defect is corrected, the less likely are such attacks to recur, provided the correction is perfect.

The time of day and the particular irritant or disturbance that produces the eyestrain headache varies with the individual. Some may experience this in the morning from the eyestrain of the day before, while others have the headache in the later part of the day and it may stop soon after the individuals go to bed. In others the headaches begin in the morning and grow progressively worse, until the patient is completely prostrated.

Astigmatism is probably the most frequent cause of intense eyestrain, usually

associated with hypermetropia. The latter alone can cause recurrent headaches, and myopia less frequently. Also the greater the defect, the less frequent the headache, because the eye may refuse to correct the image, or the image of one eye may be entirely eliminated, the patient using only one eye and ceasing to attempt binocular vision. Not infrequently, therefore, the patient with a minor optic defect, whose eye muscles always strive to give him a perfect image, is the one with the most severe eyestrain headaches.

The following questions will determine whether the headache is due entirely to tiring of the eyes:

What kind of work does the patient do, how long does he use his eyes, what does he like to do and what does he dislike to do? The answer to these questions will show whether or not the patient is suffering from an optical defect. Until the patients have determined that their headaches are due to eyestrain, they attribute it to almost anything they have done last or eaten last. Some peculiar cases do not have headache with defective eyes, but have stomach reflexes of all kinds, with indigestion, flatulence, pyrosis or hyperacidity, or cardiac disturbances with faintness, palpitation, or irregularity may be found. These conditions may be treated, whereas the real cause of the headache is eyestrain.

While the eyestrain may be limited to one eye, more frequently it goes to the other eye in sympathy. One eye, however, is usually worse than the other and the headaches are likely to begin as one-sided phenomena.

Mild forms of the headache may last all day until the sun goes down and light is less, when relaxation occurs and the headache ceases. Patients with this type

of headache may seek a dark room and wish perfect quiet

That migraine often does have a definite organic basis is illustrated by the report of Rodolfo Dassen (*Semana méd* 1 1049 (Apr 16) 1931) who found at autopsy, in a patient with ophthalmic migraine, an *aneurism* in the posterior portion of the circle of Willis. Temporary enlargement of this mass had probably caused the ophthalmic symptoms by pressure on the third nerve. Most instances of migraine, however, seem to be related to the *pituitary gland*. Timme (*Proc New York Neurol Soc* (Dec 6) 1932) cites the case of a patient whose attacks of migraine suddenly ceased following fracture of the sella turcica by an enlarging hypophysis. He is inclined to believe that the onesidedness of this form of headache is due to the asymmetry with which the vessels are disposed around the pituitary body. Evidence of the association between the hypophysis and migrainous seizures is also offered by Riley, Brickner, and Kurzrock (*Ibid*), who have found that prolactin is excreted into the urine of women subject to periodical headache a few days before the beginning of the migrainous paroxysm. They have been able, in almost every case, to precipitate an attack of headache in such patients by the intramuscular injection of prolactin. If pituitary enlargement does cause a seizure of migraine, it probably does so by means of pressure on the adjacent sympathetic plexus, thus causing cerebral vasospasm. This is the view of M. E. Herbert (*Ann d'ocul* 168-840 (Oct) 1931), who cites an instance of ophthalmic migraine due to the ingestion of methenamine, a drug which is definitely a vasoconstrictor. Another organic association with migraine oc-

asionally reported is its co-existence with hypothyroidism, stressed by A. Ley (*J de neurol et de psychiat* 31 494 (Aug) 1931). In these cases, the administration of thyroid extract will be attended with good results.

TREATMENT.—Curative treatment rests upon the determination of the exact cause, and since, in Osborne's (*Ibid*) opinion, the most frequent cause is eyestrain, an absolute correction of the optic defect, that is correct lenses and correct frames, correctly worn will make the headaches less severe and in many cases result in a cure. The examiner should determine the kind of work done by the individual, and what kind of glasses should be given the patient and whether he shall wear the glasses for near work only, or all the time. The framework for the glasses is important and must be such as not to easily get out of adjustment. Maladjusted lenses are as bad as no lenses at all, or even worse. The associated findings, such as gastrointestinal, cardiac or genitourinary disturbances, will clear up coincidentally with relief of the eyestrain.

HEMATURIA.—The significance of blood in the urine is discussed by H. Wade (*Brit. M. J.* 1 177 (Jan 30) 1932). He stresses the variable importance of this finding from the ease of cure of one case to the ultimate end in the patient's death in another. The patient should be frankly told that the cause of this condition is undeterminable upon the first examination.

The history of the patient told in his own words is of the utmost importance and value. In many instances a patient may reveal the fact that he enjoyed good health when suddenly, painlessly and profusely, hematuria developed from no apparent cause. This is frequently the

result of a villous papilloma of the bladder. In elderly individuals with arteriosclerosis and hypertension, such a history may be obtained where there is a rupture of a small blood-vessel within the bladder wall.

Where the linen of the patient is blood stained and the bleeding occurs independent of micturition, it is usually urethral in origin. If the bleeding occurs with micturition, it is important to determine whether it is at the end or throughout the entire act. If it is at the end, it is probably a trigonitis or comes from an ulcerated surface of the prostate. Where thin pencil-like clots are present, it is usually a cast of the ureter and the bleeding probably originated in the kidney.

Malignant disease of the bladder is never associated with painless hematuria, whereas an innocent *tumor* usually results in this form of bleeding. Bleeding due to a *stone in the bladder* usually follows exercise. In *tuberculous involvement* of the urinary tract, the patient seldom seeks medical attention until the bladder is infected and of 200 cases examined by Wade, 75 per cent had frequency as the most common symptom.

Renal colic and hematuria are usually dependent upon the mobility of the stone, but the presence of colic without bleeding is not always indicative of intermittent hydronephrosis. When blood first appears painlessly and there is an associated renal colic, there is probably a *tumor*, frequently a *hypernephroma*. The possibility of bleeding from a *renal infarction* or *tumor of the ureter* must also be remembered.

Physical examination may reveal the presence of one palpably enlarged kidney. This may be the only functioning kidney. The most plausible explanation

of bilateral renal enlargement is congenital polycystic kidney disease. These kidneys tend to bleed very easily.

Although x-rays of the entire urinary tract are routinely made and desirable, they are seldom a source of information as to the bleeding area. Cystoscopic examination is advised by Wade, with an instrument small enough to eliminate pain and discomfort to the patient. By this examination a *villous papilloma* may be found either as a primary or secondary growth in the bladder. In the former, it may be cured by 2 or 3 treatments with the d'Arsonval high frequency current. If the *tumor* is *malignant*, Wade advises cystotomy and removal of the entire tumor with fulguration of the base. Where the hematuria is the result of the rupture of a vessel, irrigation with saline or boric acid solution at hemostatic temperature is advisable.

When a *malignant tumor* is found in the bladder wall by cystoscopic examination, a cystotomy is indicated to determine the best mode of treatment. In advanced cases of involvement of the bladder and both ureteral orifices a transplantation of the ureters to the colon will not relieve the pain of vesical contraction upon the growth as a foreign body. A complete cystectomy is necessary if any improvement is to be gained.

Hematuria is not an uncommon finding in *prostatic hypertrophy* when there is an ulceration of the intravesicular portion of the herniated gland. Attention to this will give relief from the symptom.

Bilharziasis endemic in Egypt is seldom seen in this country. In the early stages, the parasites are found on the bladder wall as minute sago points of a chalk-like color which are surrounded

by a vascular ring. Treatment by tar emetic introduced by Christopher-son has given gratifying results.

Hematuria of a *tuberculous* origin usually occurs in the bladder from an active ulceration. The treatment is a determination of which kidney is involved with its removal and a subsequent healing of the tuberculous cystic ulceration.

Villous papillomata may occur in the ureter secondary to a renal growth, requiring the removal of both organs. Attention is drawn to the similarity of symptoms between a right ureteral stone and acute appendicitis.

Hemorrhage of *renal origin* may have several causes. When the ureteral catheter reveals bright red blood in the pelvis of the kidney, it is probably a *hypernephroma* in the renal pelvis. If the urine is tinged brown from old altered blood, a pathologic lesion rests within the parenchyma of the kidney.

Pyelography has been of extreme benefit in distinguishing the form, contour and position of the renal neoplasms, especially hypernephroma. The tubular adenocarcinoma is a peculiar tumor in that the kidney increases in size but there is no change in the contour and the drainage system is only slightly impaired, but excretory urography reveals a functionless kidney. Papillary adenocarcinoma reveals similar findings especially regarding a functionless kidney.

The *villous papilloma* of the kidney is a benign tumor which can be recognized by pyelography. This shows distinctly the villous growth occupying a portion of the renal pelvis.

In a *renal calculus* when a shadow is seen in a preliminary x-ray, its accurate location may be determined by a plate taken laterally, when this view will show the shadow in the pelvis opposite the an-

terior third of the corresponding lumbar vertebra.

Essential or *idiopathic hematuria* is the one renal disease the diagnosis of which is arrived at by a process of exclusion. The bleeding localized to one kidney has revealed no abnormalities by the usual methods of examination. The bacteriologic and microscopic studies of the urine have been negative, the pyelographic contour is normal and only after these examinations is the clinician justified in making such a diagnosis.

HEMOPHILIA.—PROPHYLAXIS AND TREATMENT.—Following the announcement by C L Birch (J A M A 97 244 (July 25) 1931) of the discovery that a hormonal disturbance exists in hemophilia which is temporarily relieved by parenteral administration of ovarian substances, the opportunity presented itself to H T Kimm and C M Van Allen (J A M A. 99 991 (Sept 17) 1932) in a case of that disease to test the efficacy of ovarian extract for controlling dangerous spontaneous bleeding and to gather data of possible future assistance for safeguarding against persistently bleeding hemophiliac patients who need surgical operations. The potential value to surgery of such clinical applications of Birch's discovery is obvious. The data from this case are reported without waiting for more material, since the disease is uncommon and prompt standardization of the surgical methods will require that data from many sources be pooled in the literature.

Birch gave daily injections of ovarian extract for 8 months to an individual with hemophilia and abolished the abnormal tendency to bleeding during that period and for 2½ months afterward. A second patient was treated

by ovarian extract for 1 month and then received a graft of fresh human ovary into the anterior abdominal wall. Examination of the blood gave normal results for 5 months. Neither the dosage of the extract used nor the details of the effects on blood coagulation were published. This investigator showed, furthermore, that the urine of hemophilia patients differed from that of normal males by the absence in the former of appreciable amounts of female sex hormone.

CASE REPORT.—History—A Chinese boy, aged 10 years, had been admitted to the hospital twice previously in 6 years for uncontrolled bleeding from superficial abrasions. The bleeding was stopped each time with great difficulty, chiefly by transfusions of whole blood, but only after development of severe degrees of exsanguination. The diagnosis of hemophilia was made from these symptoms and from the laboratory observations of marked delay in clotting time and clot retraction time, of normal bleeding time, and of the normal number of platelets. It was supported by the discovery that a younger brother had a similar history. Other male members of the family could not be secured for examination. A point of interest was that 2 years previously the patient received a blow on the flexor muscles of the right forearm and developed an intramuscular hemorrhage that led to a Volkmann's contracture. Three days prior to the present admission of the patient, he fell and scratched the lower lip, whereupon bleeding commenced and continued without interruption.

The boy was normally nourished and developed, but pale and weak. The lower lip was slightly swollen and presented a small, slowly bleeding ulcer in the mucous membrane near the margin. The only other physical abnormalities were a faint systolic murmur over the heart and the Volkmann's contracture. The erythrocyte count was 2.7 millions, and the hemoglobin estimation (Sahl) 50 per cent. Since the diagnosis was already known and treatment was needed primarily, further blood tests were postponed.

Treatment.—An intramuscular injection of 4 grains (0.26 Gm) of

ovarian extract (azoule) was given at once. The bleeding became less rapid but failed to stop, and the injection was repeated at 12 hours. Bleeding ceased at 14 hours but returned at 24 hours. A third injection at that time was followed in 30 minutes by permanent cessation of bleeding. One injection was then given every 24 hours for the next 6 days, and the ulcer healed rapidly. A dry dressing to protect the ulcer and routine nursing care constituted the only other forms of treatment. During the last 4 days of injections and the following 6 days, the blood was tested repeatedly for clotting time and clot retraction time.

Conclusions.—Because venipuncture could not be done as often as required, an exact duration and extent of the effects of the injections and blood coagulability were not determined, but certain general influences were discerned.

1 Repeated intramuscular injections of ovarian extract influenced profoundly the coagulability of the blood of this hemophilic patient; they stopped a hitherto uncontrolled and severe hemorrhage and they reduced the laboratory readings of blood coagulability to normal.

2 Isolated injections had definite but incomplete effects. At least 2 doses spaced from 12 to 24 hours apart were required to bring the laboratory readings to normal, and 3 doses in a period of 24 hours were necessary for permanent control of spontaneous bleeding. This suggested an accumulative action of the drug.

3 The effects of an isolated dose of 4 grains (0.26 Gm) were practically the same in magnitude as those of one of 8 grains (0.5 Gm), the effects of a series of injections with 4 grains given once daily were the same in mag-

nitude as those of a series with 4 grains twice daily. This was true of both clotting time and clot retraction time.

4 The effects of both isolated and repeated injections were maintained for some time after treatment was stopped, and they tended to be followed by a brief period with coagulation delayed longer than natural, before the coagulation returned to the natural state. The effects were maintained longer in respect to clot retraction time than to clotting time after 8 grains than after 4 grains, and after twice daily than after once daily doses.

5 Experience with many more cases is required before the treatment and prophylaxis of bleeding in hemophilia can be standardized, but until this is at hand the following suggestions are made. Treatment may consist in intramuscular injections of 4 grains (0.26 Gm.), begun immediately and continued at intervals of 6 hours until bleeding stops, and then at intervals of 24 hours until bleeding stops, and then at intervals of 24 hours until the wound is healed. The wound should receive the ordinary surgical care. Patients may be prepared for surgical operations by 3 injections, each of 4 grains (0.26 Gm.) of extract, the first being given 24 hours, the second 12 hours, and the third 2 hours before operation. If time permits, it might be better to give daily injections of 4 grains (0.26 Gm.) for 2 or 3 days before the operation, in addition to 1 injection 2 hours before operation.

HEMORRHAGE.—CHRONIC SUBDURAL HEMATOMA.—H. W. Fleming and O. W. Jones, Jr (Surg Gynec Obst 54:81 (Jan) 1932) report 8 cases of chronic subdural hematoma and advocate a method

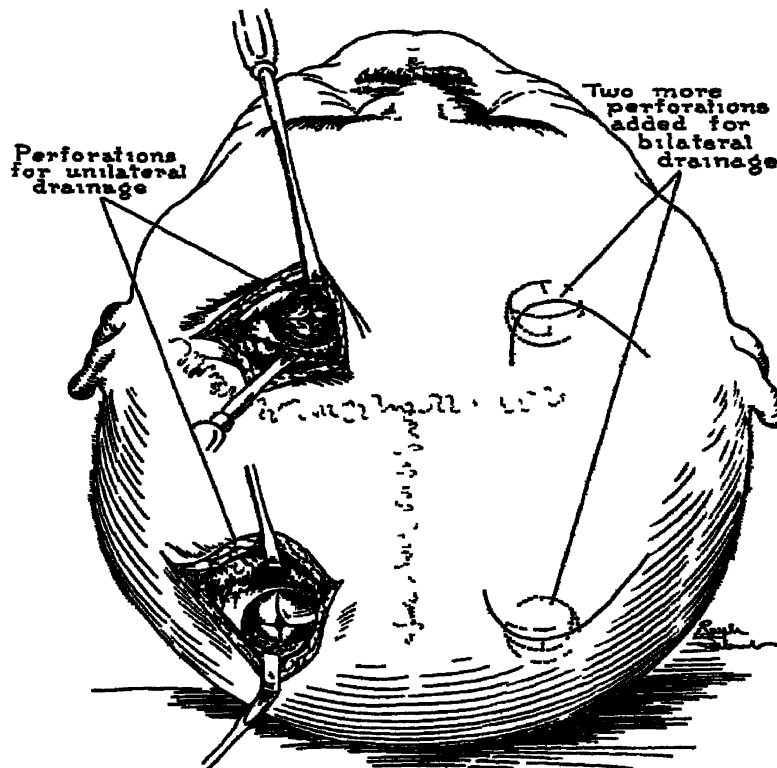
of drainage other than radical removal, as being attended with excellent results. An outline of the salient points considered with this condition is summarized as follows:

- 1 The condition occurs at all ages, most frequently in young adults—usually males.
- 2 Subdural hematomata are relatively common and frequently follow insignificant head injuries.
- 3 The interval between injury and the onset of symptoms varies from a few days to many months.
- 4 There is no typical clinical picture. The symptoms and findings are bizarre and variable, as illustrated by the occurrence of ipsilateral hemiplegia. Papilledema usually is present. Temporary remission of symptoms frequently occurs.
- 5 Early symptoms are often comparable to those ascribed to post-traumatic psychosis. Such symptoms, when followed by intracranial signs of general or local pressure or irritative phenomena, are most significant.
- 6 The spinal fluid pressure, when measured, is always definitely increased and, as a rule, the fluid is clear. Xanthochromic discoloration occasionally is encountered.
- 7 Superficial signs of head injury and x-ray evidence of skull fracture are found infrequently.
- 8 Frequently the condition is bilateral, in this series 50 per cent of the cases were found to be so.
- 9 A large percentage of cases are recognized only at autopsy.
- 10 Previous reports show that 83 per cent of the patients operated upon recovered.

The authors advocate the use of an exploratory trephine or burr opening in suspected cases, which undoubtedly offers not only diagnostic significance, but when subdural hematoma is encountered the opening of the capsule with evacuation of the wound and bloody fluid within the cavity is associated with prompt signs of relief. The possibility of a bilateral trephine or burr opening and even double openings on

the same side are now attended without risk and are easily accomplished. There is no doubt that these authors recognize and justly promote the conservative procedure which apparently has produced a materially lessened risk and an excellent postoperative result, even though the capsule of the hematoma has been permitted to remain after the contents were evacuated.

- 1 A relatively minor procedure is substituted for a formidable operation.
- 2 Exploration anteriorly and posteriorly, as described, minimizes the possibility of overlooking such a condition which in a certain percentage of cases, is bilateral.
- 3 A negative bilateral exploration can be followed at once by the diagnostic procedure of injecting air into the ventricular system.
- 4 Local anesthesia can be employed invariably.



Position of head at operation showing relative locations of trephine openings as used in bilateral exploration of chronic subdural hematomata. Curved black lines (right) show type of incision used (H W Fleming and O W Jones Surg Gynec and Obst)

The authors are not able to predict whether or not the failure to remove the remaining portion of the capsule may eventually prove to be unsatisfactory. However, the postoperative period has not been attended as yet with disturbing symptoms and the authors are inclined to await the outcome of further years of observation.

The advantages claimed for this method of simple drainage *versus* total removal are enumerated as follows:

- 5 The time which is required for the operation and the tax on the patient are reduced to a minimum.

Their summary and conclusions are as follows:

- 1 Nonoperative treatment of these patients has proved unsatisfactory.
- 2 Exploration through small trephine openings is a benign procedure and is indicated in suspected cases of chronic subdural hematomata.
- 3 Evacuation of the hematomata through small openings is efficacious.

- 4 In no instance has there been a recurrence of symptoms. Four years have elapsed since this method of treatment was first used.
- 5 In this series of 8 cases only 1 patient died, this patient was *in extremis* at the time of operation, and it is felt that this death should not negate the value of the method of operation. Six cases, two of whom had bilateral hematomata, are entirely well. One patient with bilateral hematomata complains of constant tinnitus and occasional attacks of nausea and vomiting. This is an industrial case and compensation neurosis may play some part. His symptoms are those commonly found with head injuries, and may bear no relation to the subdural hematomata.
- 6 The pineal shift is of diagnostic value in this condition as well as in cerebral neoplasms.

CEREBRAL HEMORRHAGE, SPONTANEOUS.—TYPES.—

Four types of spontaneous hemorrhages from rupture of cerebral vessels are described, according to the clinical and postmortem observations, in 20 cases by C Bagley, Jr (Arch Neurol and Psychiat 27 1133 (May) 1932). It is of fundamental importance to differentiate between the meningeal and the intracerebral types of bleeding. These groups must again be divided. The meningeal group, according to whether there is a small or large amount of blood in the cerebral spinal fluid, and the intracerebral, according to the location of the clot, *i.e.*, whether it is near the surface or deep in the substance, causing irreparable destruction.

The following grouping is offered as a working clinical basis:

Group 1—Meningeal Bleeding

Type A A small or moderate amount of bleeding, the blood being thoroughly mixed with cerebrospinal fluid. The symptoms are irritative or meningeal in character.

Type B A large amount of bleeding, with the formation of a clot. The

meningeal symptoms are overshadowed by signs of pressure. Patients in this group frequently present first the symptoms listed under Type A, but the initial bleeding may be large enough to place them in this group directly.

Group 2—Intracerebral Bleeding

Type C Large clots, deep in the substance of the brain, with extensive destruction and usually complete hemiplegia.

Type D—Bleeding into the cortex with signs of increased intracranial pressure which may appear suddenly or progress gradually, according to the volume of bleeding. Focal symptoms may or may not be present.

In Type A, that of *meningeal bleeding*, 3 cases in patients aged 33, 40, and 50 years were studied. Occasional lumbar puncture performed in 2 of the patients brought about recovery. In the third patient, a right subtemporal decompression late in the course was also done for more complete drainage of fluid. The patient died later, following a large hemorrhage from the kidney. At autopsy, a partially healed internal carotid artery, the seat of the cerebral bleeding, was found.

In Type B, 6 patients, whose ages were 22, 28, 41, 47, 51 and 60 years, were studied. The point of fatal bleeding was found in each case.

Under Type C, *intracranial bleeding*, 3 cases were studied in patients aged 27, 41, and 48 years. All of these had large deep-seated hemorrhages. In the one aged 27, hemorrhage occurred during labor. In another, aged 41, it developed as a final episode after 5 years of vascular hypertension. In the third, a man of 48 years, a large deep-seated hemorrhage in the left hemisphere with no histologic evidence of a tumor was found. Though the patient had had Jacksonian attacks for 22 months, an exploration was made with the idea that

blood had escaped into a tumor during a severe convulsive seizure just prior to admission

In Type D of intracerebral bleeding, 7 cases in patients whose ages ran from 14 to 58 years were studied. In 5, a clinical diagnosis of hemorrhage in the cerebrum was made, and in 4 cases the diagnosis was verified at operation. In the fifth case, the hemorrhage was not located at operation, but the patient made a satisfactory recovery following subtemporal decompression. Three of the 5 patients operated on recovered and 2 died. In 2 of these cases, hemorrhage was found in the cerebellum. In 1 of these, the diagnosis was made antemortem, in the other, it was not suspected but found postmortem. The patients died as a result of increased pressure. Both probably would have been benefited by evacuation of blood.

Case 20 showed early changes in small blood-vessels and beginning softening secondary to angiospasm, a condition that in some cases preceded massive cerebral hemorrhage.

G. F. Hutchinson and W. Baillie (Canad M A J 27 509 (Nov) 1932) in discussing the classification of cases of subarachnoid hemorrhage, state that the relationship of this condition to the other forms of intracranial pressure must be borne in mind. From without inwards, (1) hemorrhage may occur *outside of the dura mater*, such as results from the rupture of the middle meningeal arteries, (2) hemorrhage immediately *inside the dura mater*, which occurs in chronic or encysted subdural hemorrhage, or the pachymeningitis hemorrhages interna of Virchow, is possible. These forms are probably both due to trauma, and are characterized by the formation of blood clots. Both are more or less localized; they give rise

usually to little or no change in the spinal fluid and are amenable to surgical relief. In these respects, they differ from the remainder of the group. The third possibility is *subarachnoid* hemorrhage. The fourth possibility is hemorrhage *into the brain itself*, as in ordinary cerebral hemorrhage.

ETIOLOGY.—Hemorrhage into the subarachnoid space may be diffuse or localized, *i.e.*, petechial or variable, according to C. A. Birch (Practitioner 139 402 (Sept) 1932). It may be a complicating part of the picture of cerebral tumor, tuberculous meningitis, sunstroke, pertussis, septicemia (especially anthrax), epidemic encephalitis, and blood diseases, as leukemia, hemophilia, and purpura. Gross subarachnoid hemorrhage, as Birch points out, with no other demonstrable lesions or one causing few symptoms, may be found in association with the following: (1) arteriosclerosis; (2) "berry" or congenital aneurisms; (3) subacute infective endocarditis; (4) coarctation of the aorta, (5) polyarteritis acuta nodosa. Most cases are found as arteriosclerotic or congenital aneurism. No injury or obvious precipitating factor is noted, and the term spontaneous appears justifiable.

Bagley (*loc cit*) concludes that spontaneous cerebral bleeding, from meningeal or intracerebral vessels, is frequently the result of rupture of an aneurism, which varies in size from a fraction of a millimeter to several millimeters in diameter. Arteriosclerosis is the most common cause of these aneurisms, but syphilis, trauma, bacteriologic reactions and congenital defects of the arterial walls are responsible for the lesion in some cases; or the bleeding may be due to a direct rupture of an arteriosclerotic or a congenitally

weak vessel wall without aneurismal formation

In a study of 34 cases showing the syndrome of spontaneous subarachnoid hemorrhage, I Strauss, J H Globus, and S W Ginsburg (Arch Neurol and Psychiat 27 1080 (May) 1932) conclude that common anatomic changes in all of these cases are arteriosclerosis of the cerebral blood-vessels, with or without frank aneurismal defect

Inflammatory lesions of blood-vessels are also capable of causing aneurismal formation with ultimate rupture and hemorrhage

While spontaneous subarachnoid hemorrhage may occur at any age from 10 to 70, it is most frequent between the ages of 25 and 40

PATHOLOGY.—Pathologically, G F Hutchinson and W Baillie (Canad M A J 27 509 (Nov) 1932) divide the cases of subarachnoid hemorrhage into 3 main groups (1) those in which sudden profuse unchecked hemorrhage occurs, resulting in speedy fatality, (2) those in which a profuse hemorrhage has been checked, and (3) those characterized by small repeated self-limited bleeding. The third group is fortunately the largest one. At postmortem examination an obvious source of the hemorrhage may or may not be found

SYMPTOMS.—Spontaneous subarachnoid hemorrhage occurs more frequently than is generally appreciated, although the clinical picture is so striking that it should be easily recognized, according to W R Ohler and D Hurwitz (J A. M. A 98 1856 (May 28) 1932), who describe 24 cases. Nineteen of these cases gave a history of sudden onset, usually occurring during exertion, as in playing games, etc. This feature is valuable in distinguishing from meningitis.

Headache was complained of in 16 of the 20 cases, and the onset of this symptom was usually sudden. Patients going into coma usually remember later that a severe headache preceded the loss of consciousness

Twenty-one of 24 patients were brought into the hospital either in coma or a stuporous condition. Of the 11 stuporous patients, 4 died and 7 recovered. Of the 10 in deep coma, 8 died and 2 recovered. The presence of coma, therefore, appeared to add to the gravity of the prognosis

Vomiting is a frequent symptom and was present in 9 of the cases. It is probably due to the sudden increase of intracranial pressure. In 6 cases it was present at the onset

The neurological state was interesting. Of 24 patients, 17 could be aroused. Six showed varying degrees of confusion. All but 3 of the 22 patients examined for the presence or absence of a stiff neck had this symptom. Stiff neck occurs early in the disease and is due to meningeal irritation. It is so constant that its presence in any patient should bring up the possibility of subarachnoid hemorrhage. The stiff neck may be mild at first and increase later. The Kernig sign is frequently present and is due to meningeal irritation

Two of the cases showed numerous fresh retinal hemorrhages. One of these had marked hypertension and a history of nephritis, and the hemorrhagic areas were flame-shaped

One patient had a paralysis of the left fourth nerve on entry. The author states that this nerve is fairly frequently involved

Birch (*loc cit*) states that the symptoms may arise before the rupture if one of these "berry" aneurisms be-

comes adherent to a cranial nerve. Calcification which occurs in the wall of an aneurism may be demonstrable by x-rays. Other evidences of arterial disease may exist, but in many cases of subarachnoid hemorrhage there are no premonitory symptoms. The syndrome, clinically, depends to a large extent on the location of the hemorrhage. "Berry" aneurisms are found most frequently in the region of the circle of Willis, possibly because of the complicated development of the vessels in this region. Hemorrhage into the cisterna basalis spreading into the general subarachnoid space is, therefore, prone to occur. It is these cases of subarachnoid rupture with diffuse hemorrhage that Birch particularly studied. The sudden onset of coma without localizing signs and the finding of a bloody cerebrospinal fluid and retinal hemorrhages may occur in a large cerebral hemorrhage which has ruptured into the ventricles, since complete suppression of tone and reflexes is present at first. Such a case is invariably fatal and could not on clinical grounds be distinguished from a diffuse rapidly fatal subarachnoid hemorrhage.

Following rupture, the features of meningitis of sudden onset develop. Headache is usually intense and occipital, and there is stiffness of the neck, vomiting and often diplopia comes on. Pyrexia may be absent at first. If the hemorrhage is extensive, coma, deepening into death, is usual. Ordinarily, no paresis or other localizing sign appears, but transient and variable extensor plantar responses may be found. In other cases, leakage from a vessel may occur at any time before a large rupture leads to death. Many variable symptoms then occur, such as headache, aphasia, impairment of memory, and paralysis of cranial nerves. Not all of

the cases, however, show headache. Sometimes the patients become so lethargic as to simulate encephalitis lethargica, more particularly when subdural hemorrhage appears. Massive albuminuria and glycosuria may suggest medullary irritation.

DIAGNOSIS.—C. A. Birch (*loc cit*) writes that spontaneous subarachnoid hemorrhage as a pathological entity has been known for a long time and as early as 1857, Samuel Wilks mentioned it in his lectures at Guy's Hospital, and summarized the condition as follows. The blood may run beneath the arachnoid when the brain is injured, when meningeal apoplexy is a spontaneous disease, when an apoplexy reaches the surface, or when an aneurism bursts or a tumor bleeds there.

The classical picture is the sudden onset of symptoms of meningeal irritation, with absence of localizing signs and the occurrence of retinal hemorrhages and a blood-stained cerebral fluid. However, numerous other symptoms may occur, as noted in many published cases.

Two procedures are necessary: (1) ophthalmoscopy and (2) lumbar puncture. Retinal and subhyaloid hemorrhages may be found and give a clue to the diagnosis. They may be due to direct passage of blood along the sheath of the optic nerve, but since they may occur when the hemorrhage never reaches this nerve, they must also be due to increased intracranial pressure which causes obstruction to the return of blood from the ophthalmic veins.

Lumbar puncture will show blood which can be distinguished from blood due to the puncture itself, by the fact that it is uniformly distributed in all samples and does not clot, and, furthermore, that the supernatant fluid is fre-

quently yellow Between the repeated bleedings of slow subarachnoid hemorrhage and after a large nonfatal bleeding, the cerebrospinal fluid may be very yellow and contain flakes of lymph

Birch described 10 cases, 8 in males aged 10 to 56 years, and 2 in females, aged 33 and 42 There were 6 deaths, 4 male and 2 female, the condition being confirmed at autopsy in 5 cases One case showed an aneurism and another showed marked cerebral arteriosclerosis In the remaining 3 fatal cases, no obvious cause was determined In all the cases lumbar puncture confirmed the clinical diagnosis

G. F. Hutchinson and W. Baillie (*loc cit*) described a case of subarachnoid hemorrhage, with recovery, in a white male 35 years of age, who was admitted to the hospital in apparently good general health to have the bridge of a fractured nose built up with a portion of costal cartilage Physical examination showed no other abnormalities For the removal of the cartilage, spinal anesthesia was employed, and it was noticed on withdrawal of the cerebrospinal fluid that it was definitely bloody Since the patient had complained of no symptoms, it was considered that the blood seen was of traumatic origin and the operation was continued Four days later, the patient complained of pains like muscle cramps in his lower extremities, and the following morning the pain continued and headache developed There was some slight rigidity of the neck, a positive Kernig sign, and the right knee jerk was noticeably more active than the left Lumbar puncture at this time revealed a homogeneously bloody, opaque spinal fluid which came out under increased pressure On standing for some hours, the red cells settled out, but showed no

tendency toward clotting, and the supernatant fluid had a decidedly yellow tinge

A diagnosis of subarachnoid hemorrhage was made The patient's headache was immediately relieved, but after a few hours it returned with even greater severity and fluid was again withdrawn some 5 hours later This was more bloody than the first, and was again under increased pressure Enough was drawn on each occasion to bring the pressure down to a point rather below normal, and the patient was afforded a great deal of immediate relief The third day, however, he was somewhat confused and irritable and his headache had returned He was again relieved by lumbar puncture This time the spinal fluid was less bloody and the pressure was not so high as on the first and second occasions Daily spinal drainage for the next 2 days was performed On each occasion it was attended with relief of symptoms to an immediately noticeable degree, with lowering of the pressure, and with diminution of the amount of blood On the fifth day from the onset of his symptoms the blood had disappeared from the spinal fluid The patient made an uneventful recovery and was discharged from the hospital with no evidence of any residual damage to the nervous system His Wassermann was negative

Laboratory Observations.—These were recorded by Ohler and Hurwitz (*loc cit*) as follows

Spinal Fluid—This is under increased pressure and is always bloody. It may vary in color from pink to a dark red or deep orange, depending on the degree or duration of the bleeding. First, the white cells in the spinal fluid are proportional to the number of erythrocytes, then the number becomes

slightly elevated, usually because of an increase in the polymorphonuclears, later, because of an increase in the lymphocytes. The supernatant fluid is faintly xanthochromic within from 3 to 4 hours after the onset, and gradually becomes more xanthochromic.

Blood Leukocytosis—Of the 20 patients on whom white blood cell counts were done, 18 had over 10,000 per c c. The average count was 13,670. One patient had over 20,000.

Fever—In the 24 cases, 17 had temperatures of 99.5° F (37.5° C) or over. A temperature of 100° F (37.8° C), or over during the illness was a rule rather than the exception.

Albuminuria and Glycosuria—One case showed sugar and acetone in the urine with no previous history of diabetes and was at first thought to be a case of diabetic coma. However, spinal fluid manifestations, the history of sudden onset, and the presence of severe headache established a diagnosis of subarachnoid hemorrhage. Most of the patients had albumin in the urine in slight amount.

Associated Diseases—**Hypertension** was the most frequently associated condition in the series of cases. Of the 23 patients whose blood-pressure was taken, 12 had a systolic of 160 or over. Of these, 7 had a systolic pressure of over 190. Hypertension plays a more important etiologic rôle in subarachnoid hemorrhage than is generally supposed.

Miscellaneous diseases which were associated with subarachnoid hemorrhage were *hypertension* 12, of which 7 died and 5 recovered, *pulmonary tuberculosis*, the fibroid type, 1 recovered; *diabetes* with acidosis, 1 died; *postpartum* with *hemorrhage*, 1 died; and *bronchopneumonia* and *septic parotitis*, 1 died.

TREATMENT.—In order that the proper type of therapeutic procedure be selected, Bagley (*loc cit*) considers that careful neurologic examination is essential. In treating patients, 3 conditions must be kept in mind: (1) a *sterile meningitis*, produced by the irritating effects of blood in the cerebrospinal fluid, (2) *increased intracranial pressure*, produced by intracerebral or extracerebral clot, (3) *disturbance of the cardiorespiratory and thermoregulatory centers*, seen in extensive extravasations or large clots at the base, with destruction of the basal ganglia and rupture into the ventricle.

These latter cases cannot be benefited surgically.

Theoretically, blood in the cerebrospinal fluid, as well as intracerebral and extracerebral clots following spontaneous cerebral rupture, should be removed, as in traumatic cases, in the hope of shortening the duration of the illness or preventing a fatality.

In the traumatic cases with a tear of a normal vessel wall, within a short time there is complete occlusion of the vessel with little likelihood of recurrent bleeding, but the possibility of recurrent bleeding in these cases of spontaneous rupture, in which the outflow of blood is stayed only by a recent clot, makes the early removal of the blood a complex question. The removal of the blood in some cases, must be undertaken only as a means of controlling the more serious symptoms, allowing the patient to go through a tedious course of meningeal irritation or increased intracranial pressure until such time as the clot in the ruptured vessel becomes organized and effectively plugs it.

Subarachnoid drainage is useful in the cases in which the blood is washed into the cerebrospinal fluid, but should

TABLE I
COMPARISON OF MENINGITIS AND SUBARACHNOID HEMORRHAGE

	Meningitis	Subarachnoid Hemorrhage
	Similarities	
Headache Stupor Vomiting Stiff neck Kernig's sign Leukocytosis	Present Usual Frequent Present Usual Present	Present Usual Frequent Present Usual Present (less marked)
	Differences	
Onset	Gradual (at least several hours of malaise, etc)	Sudden.
Mental picture	Frequently irrational	Usually clear, occasionally irrational
Fever	Present and high	Often present and slight
Blood-pressure	Normal	Frequently elevated
Eyegrounds	Negative (slight choking)	Occasionally large subhyaloid hemorrhage
Spinal fluid	Cloudy and clots	Bloody or xanthochromic, no clots

TABLE II
AGES, RECOVERIES AND DEATHS IN GROUPS WITH AND WITHOUT ASSOCIATED CONDITIONS

Age	No Associated Disease	Associated with Other Conditions		
		Hypertension		Others
		160-189	190	
Under 40 years (3 recoveries) (3 deaths)				
Recoveries	3	0	0	0
Deaths	0	0	2	1
40 to 60 years (7 recoveries) (4 deaths)				
Recoveries	2	4	0	1
Deaths	1	1	1	2
Over 60 years (2 recoveries) (4 deaths)				
Recoveries	1	0	1	0
Deaths	1	0	3	0
Total				
Recoveries	6	4	1	1
Deaths	1	1	6	3

never be undertaken in cases showing evidence of large blood clots. If a clot exists, the patient recovers spontaneously or the symptoms progress, demanding removal of the clot.

Superficial localized clots can be removed through a craniotomy, a procedure in many cases contraindicated by the poor general condition of the patient and the possibility of recurrent bleeding, or by aspiration of the blood through a small trephine opening. Aspiration can be accomplished under local anesthesia, but must be delayed until there is beginning cyst formation. In the authors' series of cases, it was not followed by further bleeding. When the clot cannot be localized, serious symptoms of increased intracranial pressure may be relieved by a decompression.

Spontaneous cerebral hemorrhage is a common accident and may occur at any age.

Ohler and Hurwitz quote Symonds, who recommends lumbar puncture in the early stages only for increased pressure, otherwise, a reduction in spinal fluid pressure might increase the tendency to bleed. Symonds further advises daily lumbar punctures later to remove the blood fluid, the source of irritation to the meninges. All the patients in the present series had daily lumbar punctures during the early stage. If the pressure were elevated, the fluid was withdrawn slowly, until the pressure was lowered to from 100 to 150 mm of water. Stiff neck and headache are sometimes quite persistent, the latter occasionally lasting from 10 days to 2 weeks. Daily lumbar puncture, removal of some of the fluid, with reduction in pressure, offers a marked relief. None of the patients showed any evidence of renewed bleeding in spite of

the numerous lumbar punctures. This danger is minimized if the pressure is lowered very slowly. The danger is probably real in the few hours after the hemorrhage takes place.

In the early stage, ice-caps and salicylates may be used for the *headache*. Opiates are contraindicated, as in all cases of increased intracranial pressure, because of the danger of respiratory failure.

Usually the spinal fluid pressure becomes normal after the third or fourth lumbar tap. Persistently elevated pressure should bring up the possibilities of a cerebral neoplasm as the underlying cause.

HERNIA. —TRAUMATIC INGUINAL HERNIA. —*Etiology.* —

The relationship between injury and hernia is discussed by J. J. Moorhead (J A M A 98 1785 (May 21) 1932). He attributes hernia to the presence of a sac, either congenital or preformed, which represents an attempt of the body to buttress a weak area in the abdominal wall with peritoneum. He believes that the formation of hernia is not related to any one injury, but may be aggravated by injury. The most important factor is intraabdominal pressure. If the formation of a hernia were an immediate occurrence, local pain, swelling, tenderness, and disability would be present in proportion to the increase in size of the hernia. Such physical signs are absent. Other proofs of the chronicity of the formation of hernia are the findings of pathological examination. In the 232 cases reviewed by the author the constant finding was chronic peritonitis. It would require at least a year of irritation to convert normal peritoneum to the state usually encountered in hernial formation. Moorhead has never noted

hernia as a complication of trauma of any type, even crushing abdominal and chest injuries

INTERPARIETAL HERNIA.—According to W F Lower and N F Hicken (Ann Surg 94 1070 (Dec) 1931), the term “interparietal hernia” is applied to a group of unusual hernias located in the inguinal region between the various layers of the abdominal parietes. Anatomically, these hernias may be classified as properitoneal, interstitial and superficial

Moynihan, Halstead, and many other authorities agree that all *properitoneal* hernias have 2 loculi, one of which extends down into the inguinal or femoral canal. However, the authors have collected 14 authentic cases in which there was only 1 loculus. A properitoneal hernia, therefore, may be independent of the femoral or inguinal canals. Such hernias of the properitoneal type usually pass upward and outward toward the anterosuperior spine of the ilium, but may also pass backward and occupy the iliac fossa or downward and inward to the side of, or in front of, the urinary bladder

Properitoneal hernias are more common in males than in females because of the greater frequency of congenital anomalies in the inguinal region of the male. The right side is involved more often than the left because of the greater frequency of congenital anomalies associated with the later closing of the right vaginal process

There is no pathognomonic sign or *symptom* of the condition. Fully 90 per cent of the patients present the clinical syndrome of acute intestinal obstruction. In some cases a reducible inguinal or femoral hernia has been present for a long time, and following an apparent reduction the patient be-

comes nauseated and vomits, the abdomen becomes distended, and the bowels become constipated

In *interstitial hernias* the sac burrows between the layers of the abdominal wall and may be found between the transversalis muscle and fascia, between the transversalis and internal oblique muscles, between the fibers of the internal oblique muscle, or between the internal and external oblique muscles. The last is by far the most common position. Many authorities believe that these hernias also are bilocular, but the authors are convinced that both monolocular and trilocular forms occur

Interstitial hernias are $3\frac{1}{2}$ times more frequent in men than in women. Their outstanding clinical symptoms are those of intestinal obstruction. When a patient complains of pain in the inguinal region, nausea, and vomiting, and examination reveals an ectopic testicle and a palpable mass above Poupart's ligament, an interstitial hernia should be suspected

The sac of a *superficial* inguinal hernia descends into the inguinal canal, then through the external inguinal ring, spreading out between the aponeurosis of the external oblique muscle and the skin. It may pass laterally toward the anterosuperior spine of the ilium, upward and medially toward the umbilicus, or downward over Poupart's ligament to a point directly over the femoral ring. The first position is the most common

Treatment.—For the repair of an interparietal hernia the authors prefer the combined abdomino-inguinal route used by Moynihan if there is evidence of bowel strangulation

DIAPHRAGMATIC HERNIA.—**Types.**—According to J B Hume (Brit J Surg 19:527 (Apr) 1932), diaphragmatic hernias are of the follow-

ing types (1) congenital, (2) acquired, nontraumatic and traumatic

Congenital diaphragmatic hernias are dependent upon a defect in the development of the diaphragm. They occur in the lumbocostal triangle, in the dome of the diaphragm, and at the esophageal orifice. They may be classified as

1 Hernias through the pleuroperitoneal hiatus

2 Hernias through the dome of the diaphragm

3 Hernias through the esophageal orifice (a) thoracic stomach, (b) paraesophageal hernias

Hernias through the *pleuroperitoneal* hiatus are due to failure of the median and dorsal portions of the pleuroperitoneal membrane to close. The hiatal defect varies from a small opening in the lumbocostal triangle to complete absence of the left half of the diaphragm. The hernias usually occur on the left side. In the majority of cases the intestines are in the pleural cavity, the large intestine being to the left of the small intestine. There is no hernial sac.

Hernias through the *dome of the diaphragm* are more difficult to explain on an embryological basis. Hume believes that they usually occur without a sac and are due to the rupture or destruction of a portion of the membranous diaphragm. They are more frequent on the left side than on the right, probably because of the protection afforded by the larger right lobe of the liver. The stomach and a portion of the colon are invariably herniated. Other abdominal viscera may also enter the thorax. It is possible that hernias through the dome of the diaphragm may be caused by rupture of the diaphragm due to a sudden increase in the intraabdominal pressure.

Of the hernias occurring *through the esophageal orifice*, the thoracic stomach

is encountered much less frequently than the paraesophageal hernia. The *thoracic stomach* is not a true hernia, it is due to failure of the caudal migration of the stomach to keep pace with the descent of other organs.

The *paraesophageal hernia* is a common variety. It is due to protrusion of the upper part of the lesser sac of the peritoneum through the orifice to the right of the esophagus up into the posterior mediastinum.

Etiology.—An important factor in the formation of acquired diaphragmatic hernias is a sudden increase in the intraabdominal pressure. During violent muscular effort the intraabdominal pressure may be increased to from 100 to 150 mm Hg. Hernias produced entirely by the direct action of the intraabdominal pressure are hernias through the foramen of Morgagni or paraesophageal hernias. Some acquired diaphragmatic hernias are due to tears in the diaphragmatic musculature caused by a sudden strain. The weakest portion of the diaphragm is at the junction of the central tendon and the muscle. When the diaphragm has been weakened by not being called upon to contract to its full extent or as the result of degenerative changes, rupture is especially apt to occur at this site. Such a rupture does not affect the pleural or peritoneal covering. Traumatic diaphragmatic hernias may be caused by injury of the diaphragm by a bursting mechanism or tearing by a missile or a fractured rib.

Symptoms.—The symptoms depend entirely upon the degree of the injury and the ease with which the intraabdominal contents can be forced into the pleural cavity. Wounds on the right side usually heal spontaneously, and wounds on the left side may become sealed by adhesions.

MESENTERIC HERNIA.—

Diagnosis.—A hernia of *intestine* through the *transverse mesocolon* and *gastrocolic omentum* is described by R. Pecco (Boll e mem d Soc piemontese di chir 2.177 (Feb 6) 1932) The author emphasizes that in this man, aged 37, there were no symptoms of occlusion but only vague diffuse pains in the abdomen, especially in the epigastrium, arising particularly after meals, and eructation, regurgitation of sour and bitter fluids, and finally vomiting, all the disturbances being referable to the stenosis due to the position of the intestinal loops The symptoms disappeared following intervention, and 9 days later the patient's nutrition was without embarrassment

POSTOPERATIVE HERNIA.—

After reviewing the history, classification, etiology, prevention, symptoms, course, prognosis, and treatment of postoperative hernias, A Garbien (Ginek polska, 10 731, 1931) discusses his own statistics and the results of treatment

Of 1123 cases in which a laparotomy was performed in the Obstetrical and Gynecological Section of the General Hospital of Lemberg, during a period of 3 years, a postoperative hernia occurred in 23 (2 per cent) Fifteen of the women with postoperative hernia died, the mortality of the condition being, therefore, 65 per cent

Classification—The author divides the cases of postoperative hernia into 3 groups In the first group he places 7 cases of *mechanical hernia*, which constituted 0.62 per cent of the total number of postoperative hernias. The *pre-disposing factor* in this complication was careless suturing of the rectus sheath, and the immediate causative factor was an increase in the intraabdominal pressure from coughing or vomiting. The

prognosis was favorable, the mortality being only 14.3 per cent (1 death) The *treatment* consisted of freshening of the wound edges and immediate secondary suture.

In the second group the author places 7 cases of *asthenic hernia*, the *cause* of which was a disturbance of nutrition from cachexia, marked anemia, or diabetes mellitus The *prognosis* was poor as the mortality was 83.3 per cent (5 deaths) The *treatment* consisted in improvement of the nutrition and secondary suture.

In the third group Garbien places 10 cases of *suppurative hernia* due to infection of the laparotomy wound In these cases the *prognosis* was very poor, the mortality being 90 per cent (9 deaths) The *treatment* was conservative.

The direct *causes* of the *mechanical hernias* were diffuse bronchitis in 5 (71.5 per cent) of the cases, spreading pneumonia in 1 (14.3 per cent), and active pulmonary tuberculosis in 1 (14.3 per cent) The direct causes of the *asthenic hernias* were cancerous cachexia in 2 (33.3 per cent) of the cases, sarcomatous cachexia in 1 (16.7 per cent), diabetes mellitus in 1 (16.7 per cent), and posthemorrhagic asthenia in 2 (33.3 per cent) The direct causes of the *suppurative hernias* were primary suppuration of the fascia of the recti muscles in 5 (50 per cent) of the cases, and secondary suppuration of the fascia of the recti muscles in 5

The *postoperative hernias* may be divided according to the surgical procedure as follows

Of 368 cases of *hysterectomy* by the method of Freund, a mechanical hernia developed in 3 (0.81 per cent), an asthenic hernia in 4 (1.08 per cent), and a suppurative hernia in 6 (1.63 per cent). Altogether there were 13 hernias after

this operation, the incidence of the complications being, therefore, 3.52 per cent. Of 53 hysterectomies by the method of Wertheim, suppurative hernia occurred after 2 (3.7 per cent). Of 44 hysterectomies by Freund's method for carcinoma of the portio, a hernia followed 2 (4.54 per cent). One of the hernias was asthenic and 1 was suppurative. Of 224 supravaginal amputations of the uterus, a mechanical hernia developed after 3 (1.35 per cent). Of 264 cases in which the adnexa were removed, a mechanical hernia developed in 1 (0.38 per cent), and an asthenic hernia in 2 (0.76 per cent). The total incidence of hernia in this group was therefore 1.14 per cent (3 hernias). Of 94 cases of Cesarean section, a suppurative hernia developed in 2 (2 per cent).

With regard to the *relation of post-operative hernia to disease*, the statistics show that of 97 cases of *carcinoma of the portio*, an asthenic hernia developed in 1 (1 per cent) and a suppurative hernia in 3 (3 per cent), and of 14 cases of *carcinoma of the body of the uterus*, an asthenic hernia developed in 1 (7.4 per cent). Of 265 cases of *uterine myoma*, a mechanical hernia developed in 2 (0.75 per cent), an asthenic hernia in 1 (0.83 per cent), and a suppurative hernia in 3 (1.13 per cent). The total incidence of hernia in this group was therefore 2.26 per cent (6 hernias). Of 6 cases of *sarcoma of the uterus*, a mechanical hernia developed in 1 (16.7 per cent), and of 3 cases of *sarcoma of the ovary*, an asthenic hernia occurred in 1 (33.3 per cent). Of 114 cases of *ectopic pregnancy*, an asthenic hernia occurred in 2 (1.75 per cent). Of 226 cases of *cystic tumors and papillary cystadenoma of the ovary*, a mechanical hernia occurred in 2 (0.88 per cent). Of 98 cases of *nonsuppurative inflammations*

of the adnexa, a mechanical hernia occurred in 2 (2 per cent), and of 98 cases of *suppurative inflammations of the adnexa*, a suppurative hernia occurred in 2 (2 per cent).

The author is of the opinion that a classification of postoperative hernias into mechanical, asthenic, and suppurative is necessary because in each of these groups the symptoms, prognosis and mortality are different and different treatment is required.

INGUINAL STRANGULATED HERNIA—A case of strangulated inguinal hernia reduced *en masse* is described by H. E. Pearse, Jr. (Surg. Gynec. Obst. 53:822 (Dec.) 1931). He defines the condition as the displacement of a hernial tumor without relief of the strangulation.

Reduction *en masse* of a strangulated hernia is rare, occurring in only 0.0075 per cent of all hernias and in only 0.3 per cent of strangulated hernias.

In a study of 190 cases the condition was found to be most frequent in middle-aged men who had had a right-sided inguinal hernia of many years duration.

As a rule, the strangulated mass is forced to a properitoneal position, but occasionally the accident has occurred by rupture of the sac and displacement of only its contents. In 60 per cent of the cases the physician is responsible.

The chief factor favoring the accident is the presence of a preformed properitoneal sac. Such a pouch is probably formed most frequently by the use of a poorly fitting truss.

The *diagnosis* is made from a history of persistent symptoms of intestinal obstruction after the apparent reduction of a strangulated hernia. Local signs of the disorder are often absent, but in some cases a tumor may be palpated

above the internal inguinal ring or in the lower quadrant of the abdomen.

Early operation is indicated, as in cases of femoral hernia the condition has a mortality of 70 per cent and in cases of inguinal hernia a mortality of 40 per cent

The possibility of reduction *en masse* of a strangulated hernia is one of the reasons for the abandonment of taxis

G Bachy (Bull et mém Soc nat de chir 57 1487, 1931) reviews *ileo-mesenteric infarct* and *strangulated hernia* and reports a case occurring in a woman, aged 56, who developed an infarct of a loop of intestine in a femoral hernia which until then had been small. The hernia increased to 10 times its earlier size, but remained painless. General phenomena of severe intoxication appeared very quickly. There were signs of occlusion. As the intestine was free from evidences of gangrene, resection was not done. The patient died 40 hours after the operation.

Reports of cases of ileomesenteric infarct combined with strangulated hernia are rare. There appear to be 2 kinds of infarction in strangulated hernia. infarction caused by vascular lesions and gangrene from infection without a vascular lesion. Bachy's case was especially unusual as there was not only an infarct of the incarcerated mesentery and intestinal loop, but also an infarct which extended 11 cm above and 6 cm below the strangulated loop.

It is not difficult to understand how a gangrenous infection as virulent as that developing in a strangulated segment of intestine should become generalized in the neighboring parts of the intestine after reduction of the strangulation or first in the mesentery and then in the intestine and cause necrosis even in the absence of obliterating vascular lesions.

Such a complication probably explains some of the unexpected deaths after the reduction of strangulated hernias. The mesentery should be carefully examined. Extensive intestinal resection done by Patel, Esau, and Philipowicz in analogous cases resulted in cure. The operation was performed after spontaneous reduction of the hernia, on indications furnished by general disturbances, persistence of the occlusion, and in the case reported by Patel and Esau, the appearance of melena. In this way the infarct was found. The resections included 15, 20 and 85 cm of small intestine respectively.

TREATMENT OF HERNIA.—

The injection treatment of *inguinal hernia* is outlined by J. Marin Espinosa (Siglo méd 89 405 (Apr 16) 1932). The author obtained good results in 500 cases of inguinal hernia in adults from 40 to 80 years of age, with a treatment of about 8 to 10 injections, at weekly intervals, of from 0.5 to 2 c.c. (8 to 32 minims) each of a solution made up according to the following formula: 80 Gm (2 $\frac{2}{3}$ ounces) of absolute alcohol, 10 drops of solution of orthophosphoric acid, and as much distilled water as required to make 100 c.c. (3 $\frac{1}{2}$ ounces). In some exceptional cases he injected a larger dose (from 4 to 10 c.c.—1 to 2 $\frac{1}{2}$ drams). From his observations, the author reaches the following conclusions:

The treatment with stimulating injections is efficient when inguinal hernia may be easily reduced and the reduction maintained by a truss, regardless of the size of the hernial sac, its duration, its primary or recurrent development, and the age and general condition of the patient. The treatment is harmless and does not interfere with the working activities of the patient, since

it is of an ambulatory type, no complications are observed during its administration and it is followed by complete recovery in 85 per cent of the cases. It is advisable to have children with inguinal hernia use a truss, with the use of which, as a rule, complete cure is obtained at that age. Young persons, as well as more mature individuals in good health, should be operated on. The injection treatment should be reserved for the aged or for mature adult patients with some other coexistent diseases or poor general health.

The author warns physicians to whom the technic of the stimulating injections for inguinal hernia is unknown against the use of commercial preparations which they received from abroad or from some other cities with instructions by correspondence to give the injections. The method, which in the hands of surgeons is safe, may be dangerous if given by physicians who are not familiar with its technic.

Operative Methods and Technic.

—The intraabdominal method of removing inguinal and femoral hernia is outlined by G. P. LaRoque (*Arch Surg* 24:189 (Feb) 1932). The author describes a method of approach for removing the sac of these hernias from within the abdominal cavity. The usual hernia incision is made, perhaps slightly higher than usual, and the aponeurosis of the external oblique is exposed and divided as in the ordinary operation. The muscle fibers of the internal oblique and the transversalis are separated, and the peritoneum is opened as for an appendectomy. From the peritoneal side it is easy to recognize and distinguish between hernia into the inguinal and femoral canals, direct and indirect inguinal hernia, unusual and anomalous types of hernia, the amount

of redundant peritoneum and preperitoneal fat in and about the canal, the exact location of the bladder, vas deferens and important vessels, and whatever complications may exist.

In cases of strangulated or incarcerated hernia and of hernia with an anomalous type of sac, it needs little discussion to see the advantages of an approach from above. Incarcerated and adherent structures are safely separated from the hernial sac; restoration of circulation in the bowel occurs more promptly with the bowel free from traction, ligation and removal of omentum and resection of gangrenous bowel are more safely done under good exposure, and coincident pathologic changes in the region of the hernial orifice may be recognized and dealt with if desired. Dissection of the sac is greatly facilitated by enucleation from above, beginning in the natural line of cleavage between the peritoneum and its nonadherent coverings above the neck. The line of cleavage is easily found; enucleation downward in the natural direction beneath the fascia is done with little trauma to the cremaster, internal oblique and other muscles of the region. The bladder and structures of the cord, continuously in view, are gently brushed away and preserved from injury as enucleation proceeds.

After removal of the sac, suture of the peritoneum is made at a point as high as desirable, sometimes 2 or 3 inches (5 to 7.5 cm) above the original location of the neck of the hernia, and, if desired, by catching the transversalis fascia, the peritoneal suture may be fixed to a higher position.

Whatever plastic procedure is the preference of the individual surgeon or the most suitable for the individual case may be employed in closing the canal and

wound, and the operator is certain at the conclusion of the operation that the hernial sac is completely removed, and unless serious infection of the wound occurs, postoperative rupture will not follow.

The author has been able to re-examine several hundreds of so-called difficult hernias of large size, and has seen a sufficient number of these put to the test of hard work, heavy lifting and other straining efforts to lead him to the conclusion that this method of operating will permit the surgeon of average ability to be rewarded by a percentage of cures so much higher than that obtained by the better operative surgeons by the old method that the superiority of the abdominal approach admits of little debate.

A plastic operation for *subumbilical hernia* after *laparotomy* is described by A. Comolli (Boll d Soc med chir di Modena 31 11, 1932). He illustrates and advocates his new method based on a single case in which it was impossible to keep the rectus muscles in place, because of separation and atrophy. The procedure consists in cutting the 2 gracilis muscles at their distal extremity, leaving the proximal insertion intact, passing them through a subcutaneous tunnel to the lower edge of the abdominal incision, and placing them one beside another over the umbilicopubic line in front of the previously sutured breach between the rectus muscles.

Results of Operative Treatment.—According to R. B. Cattell and C. Anderson (New England J Med 205: 430 (Aug. 27) 1931), there are many recurrences following operations for inguinal hernia, in the literature the incidence varies from 3 to 15 per cent, depending on the type of hernia and method of repair.

A study of the end-results on patients operated upon at the Lahey clinic during the 10 year period 1919 to 1929 gives a total of 394 operations performed. Of these, 150 patients returned and were examined by the surgical staff. This latter group were used for study. The authors found recurrences in 13 patients, although but 3 of them realized that a recurrence was present when they returned. This shows clearly the percentage of error that may be present in follow-up results, obtained by letters, in determining the anatomical results. The operative recurrence was 67 per cent. Forty-four patients had bilateral operation, 8 of these had recurrences or 181 per cent. Due to the high incidence of recurrence in these cases, the authors believe that bilateral operations should be avoided except in occasional instances.

Thirty-four repairs reinforced by fascia lata showed 4 recurrences, 117 per cent. In this group, patients in which the fascia was removed from the thigh, a large bulge of the thigh muscles through the defect occurred in 2 cases. The authors point out that this was not incapacitating in any way but was very noticeable when walking. From these 2 cases the authors feel that it is wise to suture the fascia lata when feasible.

The authors used the Bassini type of repair, reinforced by strips of fascia, after the method of Galli.

P. Nordentoft's (Hospitalst. 75 731 (May 26) 1932) after-examinations from 6 months to 9 years after operation in 449 cases of "typical" herniotomy show recurrence in 45 per cent; in the 358 cases of indirect hernia, recurrence appeared in 36 per cent, in the 91 with direct hernia, 77 per cent. The fewest recurrences were seen in the youngest age-group (from 15 to 30 years), other-

wise the frequency of recurrence did not depend on age. Of the total 512 patients operated on, the mortality was 11, or 2.1 per cent, no deaths occurred after bilateral herniotomy, done in 1 sitting in 68 cases.

The review of a large material convinced E. Husted (*Zentralbl f Chir* 59 1465 (June 11) 1932) that operations for *femoral hernia* have a larger percentage of relapses than is usually admitted, but it also showed that a special type of operations, *i.e.*, the so-called inguinal methods, give better results than any others. In these interventions the inguinal canal is opened and the hernial sac extirpated high. Then the femoral and inguinal canals are closed by suturing the musculature and Poupart's ligament to the pelvic rim (pecten ossis pubis).

HERPES ZOSTER.—TREATMENT.—Niles (*New York State J Med* 32 773 (July 1) 1932) reports 16 cases of herpes zoster treated with a solution of pituitary. Eleven of these cases were well in 8½ days, and 2 were improved. Of the same number of patients treated by other methods, 5 were well in an average of 11 days.

The injection of a solution of pituitary was given intramuscularly every other day. With the exception of 1 case, 3 injections were sufficient, 0.5 cc (8 minims) being given to elderly patients for the first injection and 1 cc (16 minims) to the middle-aged and young. All except 5 patients received 1 cc (16 minims) at the time of the second and third injection.

The author could see no difference in the results obtained from the use of the obstetrical or surgical solution of pituitary.

It is not necessary to discontinue

treatment during menstruation but it should never be given during pregnancy.

HICCUP.—According to W. Mayo (*Surg Gynec Obst* 55 700 (Dec) 1932), there is no disease which has had more forms of treatment and fewer results than persistent hiccup.

CLASSIFICATION.—The following outline has been suggested for classifying the various forms of hiccup.

Infectious persistent hiccup (usually central)

Epidemic

Postoperative

Chemical hiccup

Central (this is of questionable existence)

Peripheral (reflex from chemical irritation of the stomach, intestine, diaphragm or of some structure of the same somatic segment as the diaphragm)

Mechanical hiccup (reflex from pressure)

Central

Tumor

Vascular disturbance

Peripheral

Stomach

Rapid dilation.

Slow dilation of long duration.

Tumor (irritation of diaphragm or of reflex arc that involves phrenic nerves)

Neoplastic

Inflammatory

Vascular disturbance

Hysterical or psychic hiccup

Indeterminate hiccup

Infectious Persistent Hiccup.—

Etiology.—Mayo is of the opinion that the majority of cases of the persistent type of hiccup are caused by a specific organism, and his view is supported by numerous cases studied and reported by Rosenow, with special reference to epidemic hiccup. Contagion has not been demonstrated. Rosenow's work suggests that epidemic hiccup is closely related to epidemic encephalitis. The two diseases often are found together in the

same locality, at the same time, and, occasionally, in the same patient. Bacteriologically, a close relationship is noted.

A neurogenic type of streptococcus in short chains (*Streptococcus singultus*) has been isolated from patients suffering from epidemic hiccup. It may be found in the throat, urine, and the blood. It has also been isolated from the brain and spinal fluid of inoculated animals in which hiccup developed. It is Gram-positive, not encapsulated, produces greenish colonies on blood agar plates, and grows in short chains in liquid medium. In glucose-brain broth the growth is rapid and diffuse, and aerobic cultivation destroys its specificity.

Pathology — The pathological findings in animals are confined chiefly to the basal ganglia, to the walls of the ventricles, and to the gray matter of the cortex and medulla, rather than the phrenic nerves. Microscopically, circumscribed areas of hemorrhagic necrosis, and infiltration with leukocytes and round cells especially about blood-vessels may be seen. In acute lesions bacteria may be found.

Postoperative Form. — Mayo believes that this may be due to a specific organism. The condition is found mostly in men over 45 years of age, the average age being 54.5 years. It may follow major operations on the colon, urinary tract, prostate gland, gall-bladder, stomach, and occasionally other viscera. Except for cases in which gastric operations were performed, the shortest duration of hiccup was 4 days and the longest 27 days. The average in Mayo's group was 9.7 days.

This form of hiccup tends to run a definite course, varying in intensity and duration. The course is similar to that of any infectious disease. In the early

and late periods, it is amenable to symptomatic treatment, from which temporary relief may be expected. However, when at its height, no relief measures directed against symptoms have any appreciable value, except radical steps, such as bilateral phrenicclasis or phrenicotomy. The condition appears between the first and seventh day post-operatively and there is no seasonal exacerbation.

Treatment — Three lines of treatment should be followed in cases of epidemic and postoperative infectious persistent hiccups: (1) specific treatment aimed at the cause, (2) symptomatic treatment, (3) general treatment, (4) specific treatment, *i. e.*, encephalitic antibody globulin solution. Before administration, the patient is tested for hypersensitiveness to horse serum, by injecting not more than 0.05 c.c. of the serum subcutaneously. If no urticarial wheal, associated with itching, develops in 20 minutes following the test, the therapeutic injection may be given. If the patient, however, is sensitive, desensitization should be carried out by giving from 4 to 6 subcutaneous injections at intervals of $\frac{1}{2}$ to 1 hour in doses increasing from 0.1 to 1.0 c.c. If no reaction occurs following the injections, the first therapeutic dose may be given. In acute cases of epidemic or persistent postoperative infectious hiccup, 2 to 5 c.c. of the serum should be given twice or thrice daily for 2 to 3 days, depending on the age of the patient, the acuteness of the symptoms, and on the results obtained. Injections are to be given intramuscularly and should be followed by massage to facilitate absorption.

Usually the hiccup is controlled in 1 to 4 hours after the first dose, and consequently it may not be necessary to

administer more than 2 doses. Occasionally, on or about the seventh day after the injection an *itching dermatitis* may develop. None of the sequelæ have been serious in Mayo's experience, and the patient can be kept comfortable with calamine lotion and other substances containing phenol.

Symptomatic treatment is a reasonable procedure to follow during the entire course of hiccup. Its principal object is to lower tonicity of nerves and muscles. If the case is of a truly infectious type, nothing more may be expected from this treatment. It applies mainly to the diaphragm, phrenic nerves and brain. The substances used are, principally, morphine sulphate, with or without atropine; codeine, with or without atropine, camphorated tincture of opium; barbiturates by mouth or intravenously; bromides; phenobarbital; barbital; the mixture of allylisopropyl barbituric acid and aminopyrine; chloral; chlorbutanol; quinine; carbon dioxide and oxygen by inhalation; anesthesia by inhalation, rest and quiet.

Carbon dioxide alone is dangerous, but tanks containing carbon dioxide combined with 5 to 10 per cent oxygen are valuable and relatively not toxic. A simple and more fool-proof method is rebreathing from a mask and rubber bag, even a paper bag may be tried. The gases should be applied not more than 15 minutes at a time.

Ether or chloroform poured on a piece of gauze may be held to the nose by the patient himself, and when a sufficient amount has been inhaled, he may remove it himself.

General treatment consists of measures which tend to build up bodily resistance. The avoidance of dehydration, control of diabetes mellitus, to

support a deficient heart, increase the output of fluid, improve elimination in other ways, build up a carbohydrate reserve, and treatment of anemia are some of these possibilities.

Chemical Hiccup—*Etiology*—Hiccup caused by ingestion of highly irritating foods or liquids is usually of comparatively brief duration. The chemical factor may be combined with a mechanical one, as when hiccup follows gastric operations. Following operation for a few days, swelling and edema may interfere with gastric motility, and the outlet or outlets, new or old, may function badly. Gastric secretion and old blood may be retained and become rancid, causing a chemical irritation, and being a contributory cause to reflex hiccup.

Alcohol hiccup is a notorious example of chemical hiccup.

Treatment—Treatment is removal of the cause, which is best accomplished by emptying the stomach, keeping it empty if the content cannot pass through, or, if the outlet of the stomach is patent, aiding in rapid passage through the intestinal tract what has not been vomited or washed out with a stomach tube. To accomplish this, large doses of a bland oil are better than an irritating cathartic. Copious enemas also induce greater peristalsis and aid in elimination.

Symptomatic treatment may be necessary, although it should not interfere with treatment aimed at the cause. After the causative factor has been removed, treatment should be directed at the hiccup itself, for if the hiccup continues after repeated lavage, the cause of the irritation still remains and must be properly treated.

This is apt to be forgotten and such additional irritants as Hoffman's ano-

dyne, and chloroform and sugar dribbled into the stomach in repeated doses. These additional irritants temporarily anesthetize the nerve receptors, but they tend to aggravate the condition or prolong the course of the hiccup when the numbing effect has worn off. Following the specific treatment, one or more of the following measures may be tried.

Repeated small doses of sodium bicarbonate, or other alkalis in water, olive oil in small doses or mineral oil; barbital or veronal in warm milk, ice cream; sips of warm water; soft diet; variations in foods, as few drugs as possible, sprays to the throat of 2 per cent solution of cocaine, followed by application of 20 per cent cocaine to the larynx by indirect laryngoscopy. Warm plain albolene may be dropped in the larynx and trachea after the instillation of 1 c c of 4 per cent cocaine. The rationale of cocaine is that it abolishes the afferent source of reflex irritation by way of the vagus nerves, the efferent path being, of course, through the phrenic nerves.

Mechanical Hiccup. — Structures concerned with the reflex arc may be excited by mechanical means, such as pressure.

CENTRAL FORM — *Etiology and Treatment* — Among the central causes are brain tumors, causing direct pressure because of their position or secondary pressure from a distance. When the latter is suspected, the following treatments which involve the use of hypertonic solutions should be considered. Glucose, in 10 to 20 per cent solution, intravenously, magnesium sulphate in retention enema; hypertonic cathartics, the action of which is based on the principle of drawing fluid into the intestinal tract, and spinal puncture.

Vascular disturbances within the brain or concerned with its blood supply, especially the brain stem, may be a central cause of hiccup. These abnormalities may affect the hiccup center directly.

Treatment for these conditions is rarely surgical and is usually confined to symptomatic measures and those for the relief of pressure by the use of hypertonic solutions.

PERIPHERAL FORM — *Etiology and Treatment* — Rapid gastric dilation as a cause of hiccup is illustrated by the hiccup afflicting infants. Their small, young stomachs are rapidly filled to more than normal capacity and hiccups not infrequently result. In adults, heavy meals may be followed by hiccup, due to gastric dilation. As soon as the intragastric pressure is relieved, the hiccup subsides. If it still persists it may be necessary to have the patient inspire and hold the breath, or blow into a bottle, or drink water while holding the breath, using bicarbonate of soda in solution; exerting traction on the tongue for 2 minutes, inducing sneezing by tickling the nose with a feather, lowering the head and dilating the anus; causing the patient to sip hot or cold water or hold ice in the mouth; giving sudden shock by taking the patient unawares with a loud noise, telling him to stand on the hands or the head, or to drink lemon juice and salt; or to take a teaspoonful of vinegar and sugar; flexing the legs of the patient on the thighs and the thighs on the abdomen; putting a compress of ice on the epigastrium; pressure on the eyeball; pressure over the fifth cervical vertebra; the use of aspirin or belladonna to relax the pyloric sphincter; the administration of emetics such as apomorphine.

A mechanical peripheral cause of hiccup may be *tumors*, or it may be of neoplastic or inflammatory origin, which, by direct contact with peripheral structures concerned with the reflex system of hiccup, cause the clinical form. Treatment is surgical when possible and the removal of the growth is indicated.

Aortic aneurism occasionally may produce hiccup. If persistent, operation on the phrenic nerves may be indicated, otherwise treatment in these cases should be symptomatic.

Hysterical or Psychic Hiccup — Treatment — This is most common among young women between 18 and 35 years of age, and is rare among men. It is of comparatively brief duration, but often may persist for days, weeks or months. Treatment is purely psychological. In addition to reasoning, the following may be tried: contrast baths; continued administration of sedatives in large doses, emetics, as apomorphine hypodermically, repeated lavage, large tubes being used, anesthesia; indirect tracheal intubation; and phrenicclasis.

Treatment of the *indeterminate groups* of hiccup cases may require encephalitic antistreptococcus serum, or encephalitic antibody globulin solution, and even these may fail. Finally, operation on the phrenic nerves must be considered.

TREATMENT IN GENERAL —

While the most direct therapeutic principle is removal of the cause, it may be difficult to determine this in many cases of hiccup. The most logical factor should, therefore, be selected as a probable cause, and treatment should then be instituted promptly. General measures such as gastric lavage and the administration of soda water are fre-

quently effective. If these measures fail, and if narcotics and sedatives furnish but temporary relief, it is fair to assume that the cause is central infection, when encephalitic antistreptococcus serum, sedatives and other means of affording temporary relief should be used.

HISTAMINE.—PHYSIOLOGICAL EFFECTS.—A comprehensive study of the systemic effects of histamine, with special reference to the responses of the cardiovascular system in man, was conducted by S. Weiss, G. P. Robb and L. B. Ellis (*Arch. Int. Med.* 49:360 (Mar.) 1932), who have presented a summary of the physiologic and pathologic rôle of histamine, based on these observations. Following the single or continuous intravenous administration of histamine, the latter is converted promptly into ineffective substances in the human body and the persistence of the action of histamine in man was found to be of but a few minutes' duration. With uniform intravenous infusion, the bodily changes induced were practically stationary. The minimal effective amount of histamine base in man is, according to these investigators, about 0.003 mg. per minute, corresponding to a concentration of about 1:2,000,000,000 parts in the circulating blood. The maximal amount of histamine base, administered intravenously, that produces toxic manifestations, is, 0.15 mg. per minute.

Relatively small amounts of histamine (0.003 mg. per minute) were found to cause a *depression of the T waves* of the complexes of the normal electrocardiogram. With elevation of dosage, the degree of depression increased until the T wave at times became converted. After a single intra-

venous dose, the change in the shape of the T wave was instantaneous with the arrival of histamine in the coronary circulation, and within 1 minute there was a tendency to return to the normal shape

Histamine in amounts up to toxic doses in observations of 2 hours' duration failed, as a rule, to produce any lowering of the *systolic arterial blood-pressure*. The *diastolic arterial blood-pressure* showed a tendency to fall, but in numerous instances it also remained unaltered. With increasing amounts there was a progressive rise in the cardiac rate. The *venous pressure* was either unaltered or slightly elevated

The effect of histamine on the *cutaneous blood-vessels* was not found to be uniform. The most characteristic effect was a dilatation of the vessels and small veins, this effect being frequently independent of the dilator effect on the arterioles. In one group of subjects, even toxic doses failed to produce a dilatation of the arterioles as judged by the cyanotic flush and lack of elevation of the surface temperature of the skin. In a second group of subjects, the arteriolar dilatation developed when a larger dose, rather than one that produces a dilatation of the vessels, was administered. In a third group, the dilatation of the arterioles and vessels occurred simultaneously. As judged from the degree of elevation of the pressure in the minute vessels of the skin, the arteriolar dilatation following large intravenous doses of histamine was slight as compared with that following the local intracutaneous application of histamine base in a solution of 1:3000

The different types of observations presented offer conclusive evidence, in the opinion of the authors, that the minute *cerebral vessels* of man respond to

histamine with conspicuous dilatation. A certain parallelism existed between the sensitivity of the focal and the cerebral vessels to histamine. In a number of instances the cerebral vessels were even more sensitive than the facial vessels, and cerebral arteriolar dilatation followed the intravenous administration of such small amounts as 0.003 mg of histamine base. The *cardiac output* per minute following the intravenous infusion of from 0.02 to 0.03 mg of histamine base per minute increased by an average of 1.5 liters, or to 20 per cent above the normal value. Simultaneously, there was a slight fall in the stroke volume. The mean velocity of blood flow showed a slight but distinct increase. The *basal metabolism* became elevated and, in certain instances, even to values 50 per cent above the normal. There was a slight fall in the *respiratory quotient*.

Histamine produced no demonstrable changes in the pulmonary ventilation or in the state of the bronchioles of normal persons, but had a definite bronchial constrictor effect on patients with bronchitis, bronchial asthma, emphysema and cardiac asthma.

The investigators presented evidence that during the administration of histamine, substances are formed or vasomotor reflexes develop which act antagonistically to histamine. They concluded that the vascular and other bodily responses induced by histamine in man differ fundamentally from those observed in anesthetized cats and in patients with traumatic shock, and, therefore, the rôle of histamine in traumatic shock is considered doubtful.

R. F. Hiestand and J. L. Hall (*Ibid* 49:799 (May) 1932) investigated the effect of histamine on the *alkali reserve* and on the *blood sugar* in man and

found that the intramuscular injection of from 0.5 to 0.75 mg of histamine usually produced a slight increase in the alkaline reserve, however, the increase was not sufficient to warrant its therapeutic application in acidosis. The combined administration of sodium bicarbonate by mouth and histamine subcutaneously produced a significant increase in the alkali reserve, but the increase was not significantly greater than that produced by the alkali alone. Tribasic calcium phosphate alone or combined with histamine increased the alkali reserve only slightly. The intramuscular injection of from 0.5 to 0.75 mg of histamine did not produce a significant increase in the blood sugar level in man.

Experiments on the intact animal, conducted by C. J. Tidmarsh (Quart J Exper Physiol 22:33 (May) 1932), to determine the action of histamine on the *motility of the large intestine*, showed that histamine is a powerful stimulant of the motility of the cecum and other sections of the colon. In animals with the nervous system intact, the intravenous injection of 0.25 mg of histamine caused an immediate fall in blood-pressure followed by contraction of the small bowel. After a latent period of 1 to 2 minutes the large intestine contracted. The response was typical for each region of the large intestine and appeared in definite sequence following contraction of the small bowel. The character of this motor response is very strong when an appropriate dose of histamine is employed but it is somewhat different from the spontaneous movement of the large gut, even when the latter is completely denervated. The motor response is diminished but not abolished by previous injection of atropine. In regard to the mechanism by

which the motility of the large bowel is increased no definite explanation is offered by the authors. The inhibitory influence of atropine on the action of histamine is suggestive, indicating that the parasympathetic nervous system is probably involved in some way in the reaction. The investigation also brought further evidence to prove that, under certain conditions, histamine in 0.1 to 0.2 per cent solution of the hydrochloride, may be absorbed from the small or large intestines. This fact, together with the influence of histamine on intestinal motility, emphasizes, in the author's opinion, the importance of studying the part which this substance may play under various pathological conditions, such as intestinal intoxications and diarrheas.

In a study of the *cerebral blood flow* and the vasomotor response of the minute vessels of the human brain to histamine, S. Weiss and W. G. Lennox (Arch Neurol and Psychiatry 26:737 (Oct) 1931) administered a continuous intravenous infusion of histamine phosphate solution of 1:10,000 concentration. The subjects used in the investigation were 8 young male adults suffering from epilepsy who were accustomed to venous punctures. Blood was taken from the internal jugular and basilic veins and from the cubital or radial artery. Control samples were taken before the continuous infusion of histamine was started, and, following the infusion, at a rate that varied between 0.5 and 1.0 cc per minute, samples were obtained from the same blood-vessels. In each blood sample the oxygen content and capacity and the carbon dioxide content were measured in duplicate. The oxygen saturation of the bloods during histamine injection, in relation to their saturation before,

showed the following average increases in the artery, 0.4 per cent by volume, in the external jugular vein, 4.1 per cent by volume, in the internal jugular vein, 8.3 per cent by volume, and in the antecubital vein, 12.2 per cent by volume.

The *systemic response* of the subjects during the administration of histamine was similar to that observed previously by these investigators. The systolic arterial blood-pressure showed no essential changes; the diastolic pressure remained unaltered or became moderately lower. The venous pressure remained unaltered or became slightly elevated during the administration of histamine. The cardiac output was increased in 3 and essentially unaltered in 2 cases. There was no relationship between changes in the cardiac output and the cerebral blood flow. The basal metabolism was distinctly elevated in 3 cases during the administration of histamine, in the other 2 subjects it was essentially unaltered. Measurements of the skin temperature showed an elevation of the skin temperature especially over the upper (cephalic) part of the body in 5 cases during the administration of histamine. In the fifth there was no change, although a marked flush was present and the cutaneous vessels were dilated.

As a result of their experimental observations, the authors conclude that the minute cerebral blood-vessels in man respond with dilatation to histamine and that the sensitivity of the human cerebral arterioles to histamine is unusually great. The fact that the difference in the oxygen content between the arterial and internal jugular vein decreased during the administration of histamine, indicated an increased blood flow through the brain. In the authors' opinion, the

vasomotor response of the cerebral vessels to histamine indicates that chemical substances, acting locally, may play a rôle in the physiologic and pathologic regulation of the cerebral circulation in man.

W. S. Pollard (J Clin Investigation 11: 449 (Mar) 1932) presents evidence to show that, in human subjects, histamine stimulates *secretion of gastric pepsin*. The character of the pepsin curve and the similarity of the response after the second and third injections of histamine can be interpreted satisfactorily only by assuming that histamine stimulates the peptic cells. The effect after the first stimulus is probably best explained by a mechanical lavaging of pepsin which has accumulated in the furrows and tubules of the gastric mucosa plus an actual stimulating effect by the histamine. It appears, therefore, that in studying gastric secretion in human subjects, histamine is suitable for determining the capabilities of the pepsin-secreting glands as well as the acid-secreting glands. Although the 2 processes are independent, they are influenced by the same stimulus.

UNTOWARD EFFECTS.—K. I. Melville (J Pharmacol and Exper Therap 44: 279 (Mar) 1932) presented experiments to show that a mixture of **ephedrine sulphate** and **pituitary extract** (posterior lobe) is more effective than larger individual quantities of these drugs in restoring blood-pressure and respiration and in abolishing general collapse in dogs experimentally shocked by the prolonged intravenous injection of histamine. The prolonged and well-maintained pressor effects of the mixture and the stimulant action of ephedrine alone on the central nervous system are suggested as the possible basis of these rather striking

ing effects The results suggest the possibility of applying to advantage this combined type of *treatment* in human cases of *surgical shock* and allied conditions of circulatory failure

HYDATIDIFORM MOLE.—
DIAGNOSIS.—In cases of hydatidiform mole the pregnancy reaction persists for 6 to 8 weeks after the expulsion of the mole, whereas it lasts for only a period of a week or two after delivery at term A concentration of the anterior pituitary sex hormone in the urine greater than that normally found in pregnancy is suggestive of hydatidiform mole (C Mazer and L Goldstein, "Clinical Endocrinology of the Female," W B Saunders Co, 1932) The persistence of the pregnancy reaction later than 8 weeks after the expulsion of an hydatidiform mole is suggestive of chorionepithelioma, especially if the clinical symptoms point in that direction

Urine in cases of hydatidiform mole carries the anterior pituitary hormone in concentrated form so that the reaction on the infantile mouse ovaries can be obtained with one-fifth the quantity required in the diagnosis of normal pregnancy

The *Aschheim-Zondek test* has a more important function in that diagnosis of chorionepithelioma may be made with a fair degree of certainty The continued presence of anterior pituitary sex hormone 2 months after expulsion of the mole may be regarded, according to the observations of most investigators, as evidence of the presence of chorionepithelioma In the presence of clinical symptoms a negative Aschheim-Zondek test should not be regarded as conclusive evidence against the presence of chorionepithelioma

HYDROCEPHALUS.—ETIOLOGY.—*Cerebrospinal meningitis* may give rise to hydrocephalus N G Rubinstein (Sovet vrach gaz 8-473 (Apr 30) 1932) states that hydrocephalus is one of the most frequent complications of cerebrospinal meningitis in children Among 32 cases observed by the author, 17.3 per cent developed hydrocephalus More than one-half of the author's cases of hydrocephalus complicating meningitis occurred in *nurslings* The frequency of hydrocephalus decreases with *age* Its incidence does not seem to depend upon the *severity* of the primary meningococcus meningitis An unusual case of hydrocephalus associated with spina bifida, developing 1 month after birth, was reported by G B Hassin (Arch Neurol. and Psychiat 27-406 (Feb) 1932)

PATHOLOGY.—The infant with hydrocephalus and spina bifida died of sepsis Necropsy examination revealed the replacement of the ependyma by a gelatinous mass, which partly filled the greatly dilated ventricles There was an absence of the choroid plexuses in the lateral and third ventricles, occlusion of the third ventricle, and fibrosed remnants of the choroid plexus of the fourth ventricle The choroid plexus could not have produced the fluid, for none of the plexus was present The ependyma could not have produced the fluid, for it was destroyed It was suggested that the vast accumulation of ventricular fluid in the ventricles was tissue fluid derived from the brain

Hassin concludes that hydrocephalus may occur not only in cases in which the choroid plexus is deficient, but also in those in which it is entirely obliterated by an infectious process Cases of this type, he points out, furnish additional evidence that the cerebrospinal

fluid does not originate from the choroid plexus

HYDROCEPHALUS IN CEREBROSPINAL FEVER.—Types.—

N Rubinstein (*loc cit*) recognizes 4 types of hydrocephalus complicating meningococcus meningitis

(a) An abortive form with incomplete symptoms

(b) A latent form with late symptoms

(c) A form with symptoms simulating organic destruction of the brain

(d) The paroxysmal

PROGNOSIS.—Of the patients with hydrocephalus complicating cerebrospinal meningitis studied by Rubinstein (*loc cit*), 21.4 per cent recovered, 50 per cent died, and 25.5 per cent were discharged with tendency to chronicity.

TREATMENT—Once the diagnosis of hydrocephalus has been established, H T Nesbit (South M J 24: 1028 (Dec) 1931) states that an extremely grave prognosis is known to exist. There are 3 methods of treatment available which have occasionally been attended by favorable results: (1) operative relief of obstructive types; (2) repeated lumbar or cisterna punctures, and (3) the medical treatment with theobromine sodiosalicylate. Rubinstein suggests early hospitalization of patients with meningococcus meningitis and systematic lumbar puncture with specific therapy as a *prophylactic measure*. Lumbar puncture seems to be the only method of treatment of hydrocephalus. The results with this treatment were excellent in the abortive forms, in latent forms, and also in subacute forms simulating organic disturbances of the brain and meninges. In hydrocephalus accompanied by encephalitis, the benefits following lumbar punctures are doubtful.

H Nesbit (*loc cit*) apparently successfully treated 2 infants with communicating hydrocephalus by administering theobromine sodiosalicylate (diuretin) orally.

HYDROTHERAPY.—The use of water in therapeutics has been ably covered by J B Nylén (Arch Phys Therapy 13 261 (May) 1932). He states that the greater the difference in the temperature between the water and the skin, the more intense is the thermic stimulation. The mean surface temperature of the body is recorded as 93° F (33.8° C) and water at this temperature is felt neither hot nor cold. The author brings out the important fact that water at a temperature which is the maximum the patient may tolerate has practically the same effect as cold water. It is unwise, therefore, to advise a patient to take a bath in water "as hot as he can stand" when a sedative action is desired.

The effect of the water is variable, depending upon the projective force of water in showers, douches, sea bathing or by frictions, the suddenness with which the water is applied, the area of body surface to which it is applied, and the better blood supply of the skin.

As a result of the thermostatic function of the heat regulatory center in the brain, the body temperature is affected only slightly by external temperature changes. Metabolism is raised by cold water and also by hot, if it is hot enough to raise the body temperature.

Upon the circulation the application of cold water for a brief period results in a preliminary vasoconstriction followed by a vasodilatation with peripheral hyperemia. This is frequently known as the "reaction" and therapeutic results may be anticipated by this reaction.

The thermomechanical effect of water on the action of the heart influences the vascular changes. *Cold water* decreases the rate of the heart especially by lengthening diastole. The tone of the heart muscle is also improved. The desirable effect of cold water upon the heart is dependent upon its ability to overcome the peripheral resistance without increasing its work.

Hot applications of water bring about a vasodilatation with an immediately resulting hyperemia. This is more pronounced than the hyperemia reactive to the application of cold water. The heat increases the pulse and probably lowers the tone of the heart muscle. After a brief initial rise the blood-pressure is lowered.

In *cold applications*, whether general or local, the effect on respirations is to deepen and increase the rate while heat will bring about the same result to a less marked degree.

Heat in the form of *hot water* has a beneficial effect by increasing both excretory and secretory processes. This fact has practical application in the elimination of both endogenous and exogenous poisons when the kidney function is far below normal.

On the nervous system in general either warm or cold water applications for a brief period seem to increase the sensibility of the nerves, while long-continued local applications of either hot or cold water lessen their sensibility. Heat is usually more effective, especially in spastic conditions.

Baths at a temperature of 94° to 95° F (34.4° to 34.9° C) and of long duration, 30 minutes to 2 hours, and *wet packs* have a decidedly sedative effect on the central nervous system. Long-continued baths at temperature higher than 96° F (35.6° C) cause

nervous fatigue and should be avoided in these cases.

The *towel bath* is described by the author as follows. The patient lies in the bed covered with blankets and 2 towels are dipped in a pail of water at a temperature of 60° to 70° F (21.1° to 15.6° C). One of the towels is wrung out and wrapped about the patient's arms. Brisk friction is then started and continued until the towel feels warm. The arm is then dried off and placed under the blankets. The same procedure is carried out over the different parts of the body. This sort of bath has a mild tonic effect and has the advantage of being applicable to bedridden and seriously ill patients.

Another convenient but more effective and powerful application of water is the *sheet bath*. A rough linen sheet having been dipped in water 80° to 60° F (26.7° to 15.6° C.) is rather roughly but thoroughly wrung out and spread around the patient's body from the axillæ down, and finally about the arms and legs so that no 2 surfaces of the body come in contact. The patient is then vigorously rubbed with long downward strokes. This friction is continued until the reaction sets in, which usually occurs within 2 or 3 minutes. The patient is then unwrapped, thoroughly dried and either put to bed for 15 to 30 minutes or sent for a walk in the open air, depending upon the individual case. This type of bath is more active and stimulative because all parts of the body come in contact with the sheets at one and the same time.

When an antipyretic effect is desired, a *drip sheet bath* may be given. Here the sheet is less thoroughly wrung out and is applied to the patient, followed by the usual friction. When the reaction sets in, the attendant pours over

the sheet a basin full of water the temperature of which is 5° below that of the water from which the sheet was taken, and renews the friction until the sheet again becomes warm. This may be repeated 3 or 4 times, depending upon the strength of the patient. When the reaction ceases to occur, the patient is removed and thoroughly dried, placed in a warm bed and wrapped with sufficient blankets and a hot-water bottle applied to the feet.

The *pack* is next described and here a large blanket is spread upon the cot or bed. On top of this a coarse linen sheet, previously dipped in water 70° F (21.1° C) and well wrung out, is spread. The patient is then placed in this moist sheet so that the upper part reaches the nape of the neck. He is then wrapped first with the sheet and then with the blanket. A towel should be placed between the upper border of the pack and the patient's skin to avoid irritation. The parts of the sheet and blanket overlapping the feet are tucked under the heels. This pack continued for from $\frac{3}{4}$ to $1\frac{1}{2}$ hours has a very quieting effect upon the central nervous system. In insomnia it is used to better advantage than anywhere else. It

also finds some usefulness in palpitation and exophthalmic goiter.

Under the heading of baths the author describes the *tepid bath* of 94° to 96° F (34.4° to 35.6° C) which is given for from 15 minutes to 1 hour, the *continuous bath* which requires considerable apparatus and a temperature maintained from 94° to 99° F (34.4° to 37.2° C), the *hot bath* with a temperature of 100° to 110° F (37.8° to 43.3° C) with a duration of 10 to 20 minutes. This temperature is reached gradually from an immersion temperature of 96° to 98° F (35.6° to 36.7° C). CO₂ baths are mentioned by the author and he gives them at a temperature of 93° to 94° F (33.8° to 34.4° C). From a therapeutic standpoint the most important effect is the influence upon the blood-vessels and the action on the heart. Functional changes are produced which both facilitate and increase the work of the heart. By judiciously regulating the temperature and the amount of the CO₂, either of these effects may be made to predominate. For this type of bath the heart requires a certain amount of reserve power and it is, therefore, not indicated where there is a break in compensation.

I

INFANT FEEDING.—BREAST MILK.—The study of breast milk production has been continued during the past year by Macy and her coworkers. The value of such observations is not to be underestimated in establishing the more exact status of this valuable food, on the one hand, destroying the almost medieval attitude of its invariability, and, on the other, removing many pernicious beliefs of its inadequacies. It is in the

continuation of such studies that the pediatrician may hope for a more exact knowledge in the application of breast feeding.

The separate production of the 2 breasts was studied in 3 women from the standpoint of relative composition and total quantity of milk and milk nutrients by M. Brown, I. G. Macy, B. Nims and H. A. Hunscher (Am J Dis Child. 43:40 (Jan) 1932).

Milk was taken simultaneously from each breast at 4-hour intervals during the 14-hour period and examined separately. It was demonstrated that milk from each of the 2 breasts was uniform in the percentage concentration of fat, protein, lactose, total solids, solids not fat, total ash, calcium and phosphorus. The 2 breasts functioned differently in the total production of milk and milk nutrients.

In a subsequent study (*Ibid* 43 828 (Apr) 1932) they showed that independently of variations in such factors as food, rest, activity, stage of lactation, climate and possible errors in the methods followed, there were significant changes during the day in the volume of the breast milk, and characteristic daily trends in the variation in composition of the milk with respect to the fat, total solids, total nitrogen, total ash, calcium, phosphorus and chloride components.

These investigators studied the daily and monthly variations in milk components in 2 successive lactation periods in the same women (*Ibid* 43 1062 (May) (pt. 1) 1932). It was found that the nitrogen content of the milk decreased rapidly up to the sixth month and then remained fairly constant; the calcium and phosphorus decreased gradually, although the latter increased during the latter months; the fat and total solids also decreased during the earlier months of lactation, increasing late in lactation. The results show that although the various milk components vary from day to day, they fluctuate in a characteristic manner for the individual woman, and that this same trend is maintained in successive lactation periods. However, the general trend of these fluctuations, except for individual variations, was similar throughout the lactation period of the 3 women studied.

In Moll's Clinic, in Vienna, and in Fischl's, in Prague, it has been repeatedly observed that the progress of infants who nursed at the breast was more satisfactory than those who received expressed human milk, and also that the former had fewer intestinal disturbances.

F Munchberg and J Warkany (Wien klin Wchnschr (Sept) 1932), in the Vienna clinic, showed by bacteriological and chemical examinations that expressed human milk very rapidly undergoes certain changes which they believe may be a factor in accounting for these differences.

In Prague, B Epstein and O Jehnek (Arch f Kinderh 95 194 (Feb 5) 1932) showed by means of stool cultures that the fecal flora in approximately half of a group of 57 infants who were fed expressed human milk was similar to that of artificially fed infants.

Whether or not the *smoking of tobacco by the nursing mother* has a deleterious effect upon her infant has not been established. Those who have moral objections to the use of tobacco will find consolation in the report of W Emanuel (Ztschr f Kinderh 52-41, 1931). Nicotine was found in the milk and urine of nursing mothers after the smoking of 7 or more cigarettes. The greatest concentration was found 4 or 5 hours after smoking.

BREAST MILK vs. COW'S MILK.—A comparative study of mineral and nitrogen retention in two normal full-term infants, one fed on breast milk and the other on cow's milk, has been made by W. W Swanson (Am. J Dis. Child 43-10 (Jan) 1932). The breast-fed infant was observed for 103 days and the one on cow's milk for 132 days. The retentions of minerals and

nitrogen per units of growth, except in the case of sulphur, were considerably higher in the infant on cow's milk. When cod-liver oil was added to the diet, the retention of calcium and phosphorus was markedly increased in each infant, although the retention of the other materials was not particularly influenced. The infant fed on cow's milk gained 770 grams per month and the one on breast milk, 700 grams per month.

It has been shown that infants fed only on cow's milk develop an anemia which can be cured by the administration of copper. S. G. Zondek and M. Bandmann (*Klin Wchnschr* 10 1528 (Aug 15) 1931) have made an analytical comparison of the copper content of human and cow's milk. The copper content of human milk was found to be about 3 times as great as that of cow's milk. Because of the proven need for copper, the authors suggest the *prophylactic* administration of copper to *artificially fed infants*.

COMPLEMENTAL FEEDING IN NEWBORN.—The tendency to give supplemental or complementary artificial feedings during the first few days of life is increasing. That such a program, unless judiciously administered, will ultimately lead to a decreased incidence of breast feeding is obvious. It has been demonstrated that infants can be satisfactorily fed by artificial means (H. K. Faber and T. Sutton (*Am J Dis Child* 40 1163 (Dec) 1930, abstract in *Sajous's Supplement*, vol xi, 433). Whatever the advantage in favor of breast feeding during the first few months of life, certainly in uncontrolled infant feeding and among the general clientele of a free dispensary, breast feeding is still the method of choice.

An intelligent attitude toward supple-

menting the diet of the newborn during the hospital period (first 10 to 12 days of life) is taken by H. L. Dwyer and F. C. Neff (*J A M A* 99 463 (Aug 6) 1932). They believe that it is better to have the baby leave the hospital with sufficient food to be contented and thriving, provided it can be done without endangering the breast supply. If the amount of complementary food is governed by the measured intake of breast milk and if it is not given when the breast supply becomes sufficient and never until the breast is completely emptied, the giving of additional food has no adverse influence on the ultimate breast flow. When complementary feedings are given freely or before the baby has emptied the breasts, the breast supply is endangered, and this results in early weaning. It must be remembered that for the mother to have an adequate supply of breast milk, not only must her diet and fluid intake be sufficient, but the breasts must be emptied regularly. The most satisfactory means is provided by a normal healthy sucking infant.

COW'S MILK.—There has been considerable publicity by the advocates of raw milk to stress its advantages as an infant food over those of heated milk. Much of this controversy is due to the published results of experiments at Ohio State University (E. Scott and T. A. Erf (*Jersey Bulletin and Dairy World* (Feb 11) 1931) and at the British National Institute for Research in Dairying (E. C. V. Mattick and J. Golding (*Lancet* 1 662 (Mar 21) 1931) from which it was concluded that white rats fed upon raw milk developed better than rats fed upon heated milk. To determine whether or not this was true for children, an intensive survey was conducted by L. C. Frank, F. A.

Clark, W H Haskell, M M Miller, F J Moss, and R C Thomas (Pub Health Rep 47 1951 (Sept 23) 1932) of the United States Public Health Service

The study involved an analysis of the history and development of 3700 children between the ages of 10 months and 6 years. The children were divided into 2 groups, the one, consisting of those who had received no milk except heated milk, and the other, of those who had received raw milk for more than the latter half of their lives. There were no significant differences in the development of the 2 groups as represented by the average weights and heights, the small difference in each instance being in favor of those who had received heated milk. There was a greater incidence of scarlet fever, diphtheria, intestinal disturbances and rickets among the group who had had raw milk. The increased incidence of rickets is probably explained on the basis that more of the children who had received heated milk were given cod-liver oil. From this study it is concluded that the growth-promoting capacity of heated milk plus the supplementary diet received by the average American child of 10 months to 6 years of age is not measurably less than that of raw milk plus a similar supplementary diet received by children of the same age group. The accessory substances which may be destroyed by heating can now be easily added to the diet so that the protection from chance infection which is afforded by the heating of milk is ample justification for this practice.

The effect of curd tension on the digestibility of milk has been studied in dogs by D L Espe and J A Dye (Am. J. Dis. Child. 43:62 (Jan) 1932). They found that doubling the curd ten-

sion of milk increases the length of the digestive period from 30 to 65 per cent. The percentage of casein in the milk seems to be the greatest factor which influences curd tension. Both boiling and diluting tend to lower the curd tension, while acidification of milk before its coagulation with rennin raises the curd tension.

Comparative observations of curd formation within the infant's stomach were made by H L Elias (*Ibid* 44 296 (Aug) 1932). A group of infants were fed "soft curd" milk (less than 30 Gm tension), raw and boiled certified milk, evaporated milk and breast milk. The size of the curds in the infants' stomachs were compared at 15, 30 and 60 minute intervals. Soft curd milk in the baby's stomach formed curds about equal in size to those formed from boiled certified milk, but much softer than those formed from raw certified milk. However, it was found that soft curd milk did not invariably give soft curds. In 9 out of 54 examinations there were large firm curds; this was a larger percentage of large curds than observed from boiled milk. The curd of evaporated milk was found to approach that of breast milk in quality. The author concludes that soft curd milk has no decided advantage over other certified milks in its digestibility, and that it has no unusual tendency to make infants gain weight.

EVAPORATED MILK.—The value of evaporated milk as an infant food has been confirmed by a large number of clinicians. C G Kerley (Arch. Pediat 49 22 (Jan) 1932) says that it is not only a satisfactory substitute for human milk but for cow's milk as well, and particularly for those infants who do not tolerate cow's milk. Its sterility makes it a safer feeding during the sum-

mer months and its flexibility adapts it to individual modification by the addition of water, starch, Karo or lactic acid

In a comparative study in which 2 groups of infants were fed, respectively, unsweetened evaporated milk and bottled cow's milk, L Kositz (J. Pediat 1.426 (Oct) 1932) concludes that the average normal baby is able to assimilate evaporated milk as well as, or better than, bottled cow's milk (pasteurized or boiled) During the early months of the infant's life, unsweetened

the amount A "normal" gain in weight is maintained if the intake is kept at 40 to 50 calories per pound of body weight

ACID MILK.—O Reiss (Arch Pediat 49 170 (Mar) 1932) recommends the addition of *lemon juice* to evaporated milk formulas primarily to add the antiscorbutic factor, and save the expense and time of administering orange juice and also to permit the feeding of higher concentrations The following formula was taken well by newly born infants

Evaporated milk .	14 ounces (420 cc)	Fat	32
Water .	20 ounces (600 cc)	Protein	28
Karo	1½ ounces (45 cc)	Carbohydrate	83
Lemon juice	5 teaspoonfuls	Mineral salt	06
(pH, 5.61 Calories, 21 per ounce)			

evaporated milk has certain advantages in infant feeding as evidenced by weight increases From the standpoint of economy, availability, sterility, uniformity of composition, easy digestibility, unsweetened evaporated milk is more advantageous than bottled cow's milk in infant feeding

There is a distinct trend toward simplification in infant feeding One step in this direction has been the establishment of evaporated milk as a satisfactory infant food L W Sauer (*Ibid* 1.194 (Aug) 1932) suggests that a further step in simplification may be had by the use of a standard formula for this milk in the feeding of infants The basic formula is evaporated milk, 6 oz (180 cc), water, 12 oz (360 cc), and lactose, 1 oz. (30 cc), or 2½ level, well-packed tablespoonfuls The composition, as well as the taste and digestibility, is similar to that of breast milk It has an approximate caloric value of 21 per ounce The demand for increased food is satisfied by increasing

In order to determine the efficacy of *dried lactic acid milk*, J H Hess, I M Chamberlain, and L S Robins (J A M A 98 1250 (Apr 9) 1932) observed a group of infants over a 10 months' period The infants were subdivided into groups depending upon the feeding which they received The group which received dried whole lactic acid milk was compared with those who received breast milk, breast milk complemented with various lactic acid milks, and those who received only cultured fluid lactic acid milk and sweet milk plus U. S P lactic acid Their clinical results indicated that dried lactic acid milk can be used under the same conditions as cultured sweet milk and cow's milk plus U S P lactic acid

As the result of comparative observations in 2 groups of infants, the one fed powdered *citric acid milk* and the other *powdered whole milk*, H D Lynch (Arch Pediat. 49 763 (Nov) 1932) concludes that either is a satisfactory infant food. However, he

found no advantage in favor of the citric acid milk, which he considers evidence that there is no need for further alteration of powdered milk by the addition of acid. He specifically states that this should not be construed to infer that acid milks do not have an important place in infant feeding, since it is a satisfactory method for altering the digestibility of whole cow's milk mixtures.

IRRADIATED MILK.—According to A. F. Hess and J. M. Lewis (J. A. M. A. 99:647 (Aug. 20) 1932) irradiated pasteurized milk is an adequate method for the *prevention* of rickets, being particularly applicable in urban districts. It was found that less than 1 quart (1000 cc) per day was sufficient to protect even negro infants. The chief advantage of irradiated milk in the prevention of rickets is that, in addition to furnishing an automatic method of therapy, it also provides calcium and phosphorus.

Assay of this milk by the usual rat method showed that it contained but comparatively few antirachitic units. But because of the excellent clinical results, the authors feel that this method of assay is not applicable in the appraisal of the antirachitic value of irradiated milk for infants. A similar discrepancy in standardization was also found to hold true in the tests made on specimens of milk from cows which had been fed irradiated yeast.

The antirachitic value of milk from cows fed irradiated yeast is further established by E. T. Wyman and A. M. Butler (Am. J. Dis. Child. 43:1509 (June) 1932). This pasteurized milk was shown to be an effective means for the healing of rickets, and even possessed antirachitic properties after boiling for 5 minutes.

INFANT MORTALITY.—MORTALITY RATE.—The infant mortality rate for the year 1930 in the United States birth registration area (exclusive of Utah) was 64.6 (deaths of infants under 1 year of age per 1000 live births). The number of deaths was 142,413 (Pub. Health Rep. 47:1647 (Aug. 5) 1932). This rate is still lower than that of 1929 (67.6) and is the lowest since the establishment of the registration area in 1915. The highest infant death rates were in New Mexico (145.4) and Arizona (116.6), the lowest in Washington (48.7), Nebraska (49.4) and Oregon (50.0). There are marked differences between the mortality rates of white and negro infants, 59.6 and 102.4, respectively.

Encouraging as is this decrease in infant mortality, this country still has too high a rate as compared with that of certain other countries, for example, New Zealand had an infant death rate of only 34.5 in 1930. Further, most of the decrease is in infants over 1 month of age and not in the newly born group. Much of this improvement is due to fewer deaths from gastrointestinal and respiratory diseases. What the minimum unavoidable death rate may be is, of course, undeterminable, but the need for more satisfactory preventive means in the realm of obstetrics and pediatrics is quite obvious.

CAUSE.—A study of the causes of death in stillborn infants has been made in the Department of Pathology at the University of Minnesota by J. B. Gillespie (Am. J. Dis. Child. 44:9 (July) 1932). Data was obtained from the history of the pregnancy and labor as well as from postmortem studies. The table, which is taken from this article, represents the statistical study of 338 stillborn infants.

CAUSE OF DEATH IN 338 CASES OF STILLBIRTH.

Cause of Death.	Males	Females	Total	Per Cent	Age, Months							
					Less Than 5	5 to 6	6 to 7	7 to 8	8 to 9	9 to 10	10 and More	Un-known
Stillbirth . . .	180	158	338		1	10	36	42	43	59	101	46
Syphilis	11	7	18	532	..		1	3	4	7	.	3
Toxemia of pregnancy .. .	6	9	15	442		.	1	4	3	3	3	1
Placenta previa . . .	4	7	11	325	..	.			3	2	5	1
Abruptio placentæ . .	9	3	12	355		.		2	1	4	4	1
Prolapse and compression of cord	4	5	9	266			1		1	3	4	
Prematurity	33	21	54	1597	1	3	16	12	12	2		8
Past maturity . . .	2	2	4	118		.						
Trauma at birth . .	54	47	101	2988		1	5	5	8	18	61	3
Malformation (congenital)	15	22	37	1094		1	8	7	5	5	3	8
Vaginal bleeding (cause unknown)	2	2	4	118	.		2			1	...	1
Difficult labor (cause not given)		2	2	059						1	1	.
Asphyxia (cause undetermined)	1		1	029			.			1		.
Menigitis (focal) . . .		1	1	029	.					1		.
Fetus papyraceous . .		1	1	029	.	.						1
Oligohydramnios . . .	1		1	029	.		2	1				
Intrauterine death (macerated)	31	23	54	1597		5		7	6	9	9	16
Undetermined . . .	7	6	13	384	..	.		1		2	7	3

In an excellent article on the relation of *birth trauma* to neonatal mortality and infant morbidity, H Ehrenfest (Am J Dis Child 43 426 (Feb) 1932) stresses the growing importance of birth injuries, not only in regard to the high mortality incident to them in the first few days of life, but to the various forms of stigmata which may be consequent. If the necropsy in these instances of death in the newborn includes a careful study of the dura folds within the cranium, sectioning of the vertebral column, and inspection of the abdominal organs including particularly, the suprarenal glands, evidence will be found in large numbers of stillbirths and infants dying within the first few days on the basis of birth trauma. Many such cases are now assigned to other causes, particularly asphyxia, prematurity, and congenital debility.

Extensive necropsy observations have disclosed fatal intracranial lesions in about 25 per cent of such infants, and in another 25 per cent there is evidence of intracranial damage which is not necessarily sufficient to cause death. While birth injuries are not wholly preventable, it still remains that a great number are due to manipulative interference. "The rapid growth of an operative trend in the obstetric practice of this country cannot fail to prove alarming . . . whether the blame rests with physician or patient . . . excess in this respect could best be curbed by wide propagation among the women of this country of the fact that ready compliance with their ever-increasing insistence on a short and comfortable labor is not fully compatible with the principles of sane, conservative obstetrics and inevitably implies certain risks to themselves and their infants."

INSULIN.—ADMINISTRATION.—There have been many attempts to introduce insulin into the body by other routes than the hypodermic administration and while none of the investigators felt that any of their experiments offered data that might be used in the clinical treatment of cases, some would seem to indicate that a portion of the insulin was absorbed from the gastrointestinal tract and that a certain amount of depression of the blood sugar followed. J L. Bollman and F C. Mann (Am J Med Sc 183-23 (Jan) 1932) report the results of their experiments on the enteral use of insulin. These experiments were conducted on animals in which a loop of the ileum had been isolated from the remaining portions of the gastrointestinal tract. They demonstrated that insulin injected submucosally into the ileum is about equal to that injected subcutaneously in producing a definite decrease in the blood sugar. Into this isolated loop of ileum they put large quantities of insulin and were unable to demonstrate any appreciable effect on the blood sugar of normal dogs, and concluded that about 90 per cent of the insulin instilled disappears within 1 hour and that this is destroyed either in the lumen of the intestine or in the mucosa. They quote the work of others that possibly some of the insulin is not destroyed but may be inactivated and excreted by the kidneys. They conclude, after similar experiments on the duodenum and jejunum as well, that insulin has no action whatsoever if given by bowel. (This work has a very practical value when it is realized that a large number of "insulin" capsules and pills and other preparations are peddled about to diabetics and occasionally to physicians. There is still no experimental or clinical

evidence whatsoever that insulin is active if given in any way except hypodermically—Ed)

PHYSIOLOGICAL ACTION.—

The question of the relationship between the external secretion of the pancreas and impairment of its internal secretion, insulin, have been subjects of much investigation and interest. Most of the early work has been unsatisfactory because of the lack of a satisfactory method for determining the activity of the pancreatic enzymes. An interesting bit of research is reported by G. Iacono (Policlinico (sez. prat.) 39:133 (Jan. 25) 1932). She states that her research on amylolytic, lipasic and proteolytic ferments led to the following conclusions. That amylase contained in the blood serum of diabetic persons is much diminished in relation to normal and also the amylase content of the urine and of the duodenal juice and of the feces, although the diminution is not as marked as in the blood serum. The small quantity of amylase is, however, not in direct relation to the degree of pancreatic lesion. In a person in good general condition with moderate hyperglycemia and glycosuria, the quantity of diastase in the blood serum especially was notably reduced, while in others in more grave conditions, the diminution was less marked. The lipase in the various enzymatic fluids of diabetic persons is likewise found to be diminished. The trypsin in diabetic persons did not show appreciable changes, so that it may be regarded as practically normal. Insulin treatment in diabetes increased notably the values of the diastase, and slightly those of the lipase, but left the trypsin unchanged.

UNTOWARD EFFECTS.—The question of *anaphylactic reaction* to insulin has been considered since the early

days of insulin manufacture, but with the development of the production of insulin by the various manufacturers, the ordinary commercial product now possesses a purity approaching that of crystalline insulin. Many of the early reactions were due to either the preservative used or to some pancreatic tissue other than island tissue included in the extract. In these cases the reaction, for the most part, was local and very obviously that of irritation rather than of true anaphylaxis.

F. N. Allan and L. R. Scherer (Endocrinology 16:417 (July-Aug.) 1932) report their experiences with insulin *hypersensitiveness* at The Mayo Clinic. They found an increasing number of cases that have various allergic reactions, from 3.2 per cent in 1927 to 14.1 per cent in the early part of 1931, and they are unable to explain the reason for this increase, except possibly that they are seeing more cases that have had insulin previously. The manufacturers state that there has been no significant change in the method of preparation of the insulin solutions. They have found, however, that there seems to be a variation in the incidence of allergy from month to month. They divide their reactions into the mild local reaction which is characterized by stinging, burning or smarting pain at the time of the injection followed in an hour or two by swelling of the tissue and redness of the skin, and in many of these cases there may be a wheal of extensive induration in the surrounding skin. This reaction reaches its maximum in from 12 to 24 hours and gradually disappears in from 1 to 3 days.

Severe local reactions which present these same manifestations in a greater degree, have local reactions which usually become manifest between the third

and fourteenth day after beginning the treatment. It is uncommon for a patient to have allergic reactions from the first injection. If, however, a hypersensitive patient has had his insulin discontinued, he may, upon its resumption, develop reactions. If insulin has been used for 2 weeks continuously without trouble, it is rare for any allergic manifestation to appear. In the general allergic reaction these workers found *urticarial eruptions* and *edema* were the most common cutaneous changes. They may be preceded by *tingling* and *burning* of the part to be affected and may be associated with intense *pruritus*. Occasionally they have seen an *angioneurotic edema* occurring on the mucous membranes. Some of these cases have a history of *abdominal pain*, *nausea* and *vomiting*.

In the large majority of these cases, changing from one brand of insulin to another was frequently sufficient to cause a disappearance of symptoms. In this group of 100 cases they had 5 cases with severe enough reactions to make the continued use of insulin a question of grave importance. They feel that this reaction is due to the protein of insulin itself, which is not entirely free from protein, and to some extent to the pancreatic protein which varies with the species. They have found that this seems to be a sensitivity to the pancreatic protein, as patients who were not sensitive to beef muscle protein and pork muscle protein would give reactions to the beef and pork pancreas protein, they state also that the fact that the patient may become hypersensitive towards injected insulin indicates that it is different from the endogenous insulin, because it is impossible to become hypersensitive to a natural product within the body.

[This abstract is of interest because it recounts some of the troubles of certain groups of investigators. It should not be construed, however, to in any way retard or delay the prompt and adequate use of insulin in the treatment of diabetes. The figures obtained by these investigators are higher, by far, than those seen by others, and when it is considered that literally hundreds of thousands of patients are daily receiving from 1 to 5 injections of insulin, the wonder is that more do not develop sensitization. The 5 cases reported here as having very severe allergic reactions to insulin were the only 5 out of a group of approximately 2000 cases of diabetes. It has been the personal experience of the abstractor that in 3 hospital clinics only 1 case of severe insulin allergy was encountered and that this responded very easily to a change in the brand of insulin used. Insulin is still the most satisfactory means of controlling a case of diabetes of average severity and its use should be discontinued only after careful and thorough study of the individual case.—ED.]

THERAPEUTICS.—Insulin has been used for some time in *nondiabetics* with *malnutrition* with the thought of stimulating the metabolism and consequently improving the nutrition. C W Lueders and M E Watson (Arch Int Med 49 330 (Feb) 1932) report their observations on a series of cases in which a careful study of the pancreatic enzymes was made. They report that their tests for enzyme concentration are satisfactory enough to be able to obtain a quantitative estimation. Their patients were put on increasing dosages of insulin which progressed until the patients were receiving 60 units of insulin a day. They found no severe reactions, but that there was a return to the normal sequence of the A, B and C bile fraction. In other words, the function of the biliary tract, together with the external pancreatic function, was improved. A study of the stool before and after insulin therapy gave results which showed a direct parallel in the

more complete digestion and assimilation of food elements and increased concentration of pancreatic ferments. They state that from their experience with 18 cases, there is justifiable proof that the gain in weight in most of these cases was due, in part, to the stimulating effect of insulin on the external pancreatic secretion and bile, and in part to a resulting normal digestion and better assimilation of the diet.

HYPERINSULINISM.—Recognition of the clinical condition of hyperinsulinism has been made more frequently in the last few years and many articles have appeared reporting cases which showed the rather classical symptoms of hunger, sweating, attacks of syncope, which were relieved by the administration of glucose. This condition, from a laboratory standpoint, is the direct opposite of diabetes, and is one in which the amount of insulin secreted is supposed to be greatly increased or possibly the amount of the adrenalin secreted greatly diminished. It is still a disputed point as to whether or not hyperinsulinism is a true clinical entity, except those cases of hyperinsulinism which are associated with definite tumor formation of the Beta cells of the islands of Langerhans. It is being recognized, however, that many clinical conditions which have hitherto been rather difficult of explanation are associated with a low blood sugar during the greatest period of manifestation. Whether or not this is secondary or whether it may be the cause of them is, of course, at times rather difficult to say.

A recent paper on this condition reports the observations on a case of hyperinsulinism over a period of years by B. E. McGovern (*Endocrinology* 16: 293 (May-June) 1932). The patient's

chief complaints, as will be noted from the abstracted history given below, were attacks of amnesia and coma occurring during the forenoon, with a low blood sugar during the individual attacks, freedom from the amnesia and coma during which frequent carbohydrates were given, and failure to find any other cause which might be associated with the illness. In this case treatment such as luminal, bromides and other sedatives, as well as a ketogenic diet, failed to prevent the concurrent attacks of epilepsy. Pituitrin would, however, restore consciousness during the individual attacks but the administration of carbohydrates every hour during the forenoon rendered the patient symptom-free for a period of 1½ years, up until the time of the report.

History of Present Complaint—The onset of the present trouble was in 1920, when the patient began to experience attacks of amnesia and unconsciousness, these attacks usually began in the forenoon, and while their number in a given time varied somewhat, he often had several in a single week. While in the grip of an attack, he would lie down or even fall down, although he sometimes walked about muttering or shouting, during the more severe phases, he frequently exhibited moderate tonic or clonic muscular spasms and stertorous breathing. When he regained consciousness, he rarely or never had any recollection of what had occurred, but before unconsciousness overcame him, he often felt a warning aura in the form of dizziness, chilly sensations, weakness, diplopia, perspiration, and a craving for sweets. He early became aware of the fact that an attack could frequently be aborted by eating something or drinking brandy.

Shortly before his admission to the Union Printers' Home, he was observed by C. F. Kemper, Denver, Colo., who noticed the similarity of the symptoms to those produced by an overdose of insulin, and on examining the blood, found the sugar content low. A tentative diagnosis of Addison's disease was made. Under frequent carbohydrate feeding he remained free from the trouble, how-

ever, after a short time he abandoned the treatment and promptly lapsed into his former condition

During September, 1928, a diagnosis of 'epileptic equivalent' was made at The Mayo Clinic. No evidence of Addison's disease was found. It could not be determined whether or not the trouble was caused by the kick from the horse which the patient received in 1917 (related in past medical history). He was advised to try bromides whenever he felt an attack impending.

During the latter part of September, 1928, the patient entered the hospital of the University of Colorado, under the service of F. G. Ebaugh.

Here the Wassermann reaction of the blood was found to be negative, the basal metabolism was reported to be within normal limits, the sugar content of the blood was 64 mg., the nonprotein nitrogen of the blood, 30 mg., and the urea content 20 mg. per 100 cc. Nothing abnormal was found in the urine. The spinal fluid was examined on 2 different days. The first examination showed a cell count of 4 per cmm., a negative Wassermann reaction, a protein content of 25 mg. per 100 cc., a sugar content of 28 mg. per 100 cc., and a negative gold curve reaction. The second examination revealed similar findings, except that the protein content was 30 and the cell count was 6. Ventriculography disclosed nothing of a definitely pathological nature. The sugar tolerance curve showed prolongation and lowering. No diagnosis was made.

During observation at the Union Printers' Home, the patient had always been well-nourished and muscular, his weight varied from about 175 to 188 pounds, his height was 5 feet, 10½ inches.

Inspection of the face showed some brownish pigmentation about the forehead and sides of the neck, the distribution of which suggested a pituitary, rather than an adrenal, origin.

The chest examination revealed impaired resonance and narrowing of Kroenig's isthmus over the right apex, a few rhonchi were heard over the same region. Examination of the heart disclosed no significant abnormality. His blood-pressure varied from 92/60 to 126/76 during the several years of observation.

Laboratory Investigation — During May, 1926, tubercle bacilli were found once in his

sputum, but subsequently repeated examinations failed to disclose the bacilli again. The leukocyte count varied from 14,000 to 18,000 white cells per cmm. while the erythrocyte count was usually 5,000,000 per cmm., and the hemoglobin was 96 per cent by the Dare method.

X-ray Investigations — In April, 1927, a skiagram of the skull revealed no abnormality. A chest plate in December, 1927, disclosed a hazy right apex, the root shadows on both sides were increased in density, and the left side showed many adhesions to the diaphragm. Both antrum and ethmoid regions were clouded.

During March, 1928, x-ray pictures taken after the administration of iodine contrast dye demonstrated a normal gall-bladder shadow which disappeared in 1½ hours after taking a fat meal.

On May 10, 1928, while the patient was in coma, blood was taken from his arm vein, and the sugar content was found to be 30 mg. per cent. Several times later this procedure was repeated, when the patient was in coma, with similar results. However, when the patient was not in coma, the sugar content of the blood varied from 64 to 76 per cent.

The reaction to insulin was then tested. Successive daily doses of 5, 10, 15, and 20 units were ineffective in precipitating an attack. The blood sugar before the large dose was 666 mg. per cent and 20 minutes later was 50 mg.

Diagnosis.—On April 19, 1928, a tentative diagnosis of hyperinsulinism was made. The possibility was recognized that this could be relative or secondary to some other imbalance, as well as due to adenoma, hyperplasia, neoplasm, or overactivity of the pancreas.

Treatment — The Peterman ketogenic diet was given a trial on several different occasions, but it did not control the attacks; in fact, urine was taken on 1 or 2 occasions while the patient was in coma and considerable amounts of acetone were found.

The Mayo Clinic advised the trial of bromides to control the attacks. Luminal, bromides, and other sedatives were given many trials, but the results were also negative.

C. F. Kemper prescribed the Moorehead regimen. This, too, failed to influence the attacks, as did also the regular administration of pituitrin. Pituitrin was of some aid in

restoring consciousness when the patient was in coma, but for this purpose, adrenalin was much superior, as was also the intravenous administration of glucose. Adrenalin and glucose given simultaneously caused a still more prompt return to consciousness.

January 29, 1930, frequent carbohydrate feedings were resumed once each hour during the forenoons. Up to July 8, 1931, the patient has suffered no attacks of amnesia or coma.

INTESTINES.—PHYSIOLOGY.

—The activity of isolated intestinal segments is outlined by C. B. Puestow (Arch Surg 24:565 (Apr) 1932). The author isolated various segments of bowel from the intestinal tract and transplanted them onto the abdomen. It was observed that feeding stimulated an increase of muscular and secretory activity and hyperemia of these segments. Because food did not come in contact with the segments, the stimulus must have been carried by nervous or vascular pathways. Following division of all extrinsic nerves to these intestinal transplants, the response to food could not be clearly demonstrated. This suggested that the increased activity after feeding was at least partially due to extrinsic nervous control. Electrograms made of these various isolated segments of intestine revealed a characteristic curve of altered potential. They also showed a constant rate for a given segment under most conditions studied. The rate was most rapid in duodenal segments, less in jejunal segments, and slowest in segments of the lower part of the ileum. Peritonitis and ether anesthesia were found to diminish this rate moderately.

DIAGNOSIS.—Perforation of the small intestine caused by *periarteritis nodosa* is described by M. Friedman (Nov chir. Arch 22:354, 1931). He states that *periarteritis nodosa* is a rare

disease, only 200 cases having been reported in the literature of the world and in Russian literature only 20. Even in this small number the pathologico-anatomical study was insufficient. An accurate diagnosis can be made only by detailed histological examination. The symptoms are manifold. On the basis of the symptoms, Melnikov-Razvedenkov distinguished isolated involvement of single parts such as the brain, spleen, lungs, heart, kidneys, stomach, intestines, skin, nerves, and muscles. In the author's opinion it is more correct to consider the disease as involving certain organs more severely than others rather than as affecting isolated organs.

The condition is about 3 times as common in women as in men and occurs most frequently between the ages of 20 and 40 years.

It has been attributed to a specific unknown agent, to syphilis, and to various conditions such as angina, gonorrhea, scarlet fever, rheumatic fever, and sepsis.

The author reports the case of a woman 29 years old who had suffered for 2 years from attacks of severe colicky pain in the abdomen and was operated upon for peritonitis. Laparotomy revealed an annular narrowing of the jejunum about 1 meter from the plica duodenojejunalis. In the center of this area there was a perforated ulcer. Resection of the involved segment of intestine was followed by recovery. During the patient's convalescence, evidence of pylorospasm was noted. Macroscopic examination of the specimen removed at operation revealed extreme narrowing of the lumen. As there was no evidence of scar formation in the wall of the bowel in the vicinity of the ulcer, the author concluded that the stenosis was spastic. Microscopic ex-

amination revealed periarteritis nodosa in the wall of the ulcer and especially around the mesenteric vessels

Simple ulcer of the small bowel also requires further pathological study. The lesion is rare. It may remain clinically latent, cause indefinite pains, suggest appendicitis, or lead to perforation peritonitis. It has been attributed to various obliterating processes in the blood-vessels. The author suggests that periarteritis nodosa may be a cause.

DIVERTICULA AND DIVERTICULITIS.—According to J. M. Lynch (J. A. M. A. 98:973 (Mar 19) 1932), *diverticula* may occur anywhere in the intestinal tract, and in many instances there is an embryologic basis for their existence. They occur anywhere in the bowel, but more frequently in the sigmoid than in any other part of the alimentary canal.

The bowel is developed from a diverticulum and from it, as diverticula, arise the liver and pancreas and the cecum with its degenerate end, the appendix. In regions where diverticula are a normal developmental necessity, sporadic secondary diverticula may occur. In other instances, they may be merely structural imperfections of early fetal life, as in the case of the outgrowths of intestinal epithelium perforating the muscular coat, which occur about the third month and which may, later on, be responsible for diverticula (Lewis and Thyng).

Diverticula may be divided into *complete*, which involve all the coats of the intestine, and *incomplete*, which involve only the mucosa and peritoneum. The author thinks that the classification of diverticula as *true* and *false*, suggested by Rokitsansky, is much better than division into congenital and acquired, because to Lynch's mind the evidence,

so far, in favor of the acquired theory is not convincing.

Etiology.—All the causes so far assigned do not satisfactorily explain diverticulosis. Lynch (*loc cit*) believes that diverticula, like hernias, have the same underlying etiology, like cancer, they occur at all ages, but are most manifest after the age of 35, they occur more frequently in males than in females, are much more frequent than is at present appreciated, and are always associated with symptoms, but, as in hernia and a good many other diseases, the symptoms are not so obvious as to suggest their origin. In other words, there are so many other ways to account for the symptoms accompanying diverticulosis that they are usually assigned to some simpler pathologic condition.

Diverticulitis may occur at any point where a diverticulum has formed, but the most frequent site is the sigmoid. The sigmoid is a loose, movable organ. It is subject to twists and volvulus and variation in position. This seems to the author the probable reason why inflammation occurs most often in the sigmoid. The sigmoid usually contains hard fecal matter, and its variations of position cause it to be more liable to injury than are any of the other parts of the colon.

In the opinion of A. L. Lockwood (J. A. M. A. 98:961 (Mar 19) 1932), duodenal diverticula are probably of 2 types, congenital and acquired. The so-called *congenital or developmental type* occurs within 3 cm. of the ampulla of Vater, usually proximal to it, about the opening of the common bile duct and, as such, frequently involves the head of the pancreas. They possibly occur in Keith's weak points in the bowel or in the congenital buds of Lewis and

Thyng The mucous and submucous coats are involved It is a question whether many so placed demand surgical treatment

The *acquired type* has generally been supposed to be due to a "blow-out," from pressure within the bowel, of the contracting scar tissue about a healed ulcer A hernia occurs with pouch formation The pouches become globular in outline and, on being followed roentgenologically, they are seen to enlarge gradually All the coats of the bowel are involved, so that only the mucous and serous coats remain intact, and ulceration and perforation have been found in them Although it has been supposed that they develop from the border of a healed or healing duodenal ulcer, nearly three-fifths have occurred in the second portion of the duodenum, and one-fifth in the third portion, where ulcer is not commonly found They must not be confused with the pouching that takes place with some penetrating duodenal ulcers None of the latter are included in the author's cases In addition, signs of an old scar at the ostium have not been found in any of the author's cases at operation It is more probable that they occur about the blood-vessels as they enter and leave the coats of the intestine The great majority develop on the inner curvature of the bowel, just posterior to the reflection of the peritoneum Two of the writer's group have been found on the outer curvature of the second portion, and one directly anteriorly on the second part On the third part they were found on the upper border and tend to fall down behind the intestine All have been retroperitoneal except the one on the anterior aspect of the second part of the duodenum

They vary in size from not more than

1 cm in diameter to from 8 to 10 cm One has been reported which was found at necropsy, opening from the inner border of the second portion and hanging over the brim of the pelvis, that contained more than 1000 cc of fluid Approximately three-fifths were single and two-fifths were multiple They may have a small opening into the bowel with a long neck to the sac, or they may have a wide ostium that readily admits 1 or 2 fingers In the first portion of the bowel a wide opening is more common, whereas in the second and third portions a narrow opening is found They may occur at any age, but are more common in patients past middle age

Symptoms.—The pathognomonic symptoms of duodenal diverticula, according to A L Lockwood (J A M A 98 961 (Mar 19) 1932), are as follows

1 A long history of epigastric distress without periods of well-being

2 Pain (*a*) always in the same position; (*b*) aggravated by food immediately after eating, (*c*) relieved only by vomiting, belching of gas, or the avoiding of food, (*d*) of a bursting type directly over the sac

3 The finding of the diverticulum by x-ray

Diagnosis.—The diagnosis of diverticulitis is sometimes a matter of great concern, according to Lynch (*loc cit*), for there are other conditions which closely simulate it Because of the mobility of the lower sigmoid, the symptoms may be entirely right-sided and suggest appendicitis, a justifiable and quite natural error If the diverticulum involved is located in other parts of the colon, a relatively infrequent occurrence, accurate diagnosis may be impossible. Occasionally, acute intestinal obstruction occurs, supervening on a chronic hyper-

plastic diverticulitis or kinking of the small intestine by adhesions

A L Lockwood (*loc cit*) finds that up to the present, approximately 357 cases have been diagnosed by x-rays, and 66 patients have been operated on. At the Lockwood clinic, 51 cases have been diagnosed by x-rays and 22 of these have been dealt with surgically, it is the author's firm conviction that at least 38 patients should have been so treated and will yet return for surgical intervention. Various authors report

adequate dietary control. Diet may benefit the condition somewhat, but does not cure it. Frequently, patients are not relieved at all by a dietary regimen. Patients with retention in the sac rarely respond to medical care. Ulceration, bleeding and perforation have occurred while patients were on palliative treatment.

Surgical treatment consists in dissecting and freeing the sac, the neck of the sac is then crushed in a pair of curved forceps, and ligated, the sac is

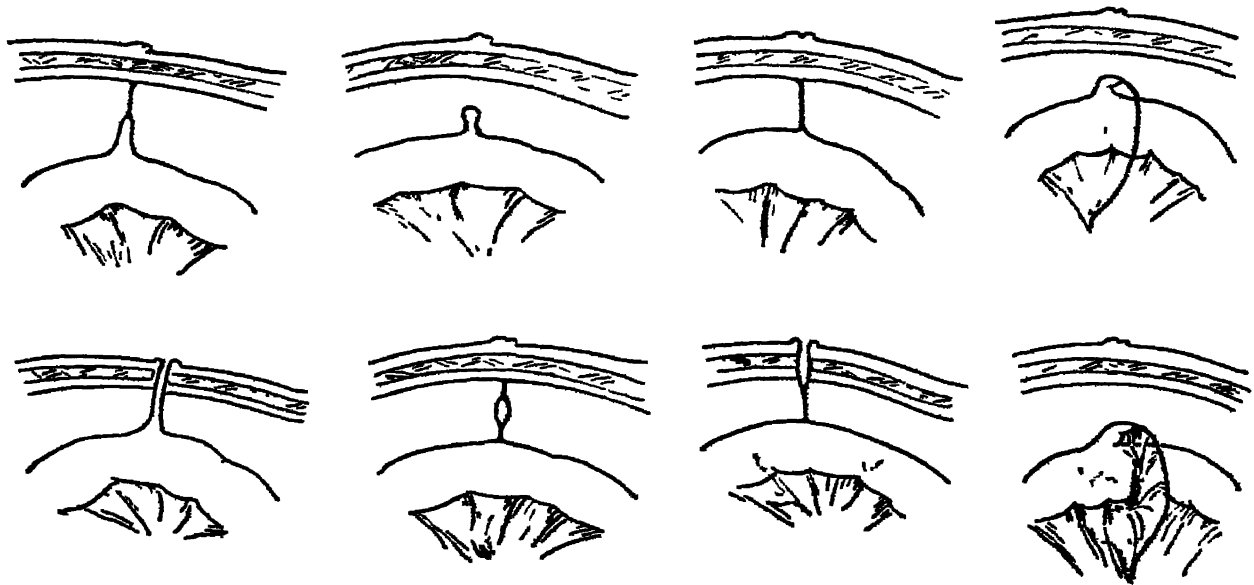


Fig. 1—Diagram of possibilities in Meckel's diverticulum (H W Hudson, Jr and L H Koplik New England J Med)

the incidence of duodenal diverticula as 2.2 per cent of routine necropsies. The Lockwood Clinic has found them in approximately 1.7 per cent of routine gastrointestinal x-ray examinations.

Differential Diagnosis.—In the realm of *differential diagnosis*, Lynch (*loc cit*) mentions carcinoma of the rectosigmoid, malignant vesicocolic fistula, gynecologic conditions in the pelvis, sigmoiditis, hyperplastic tuberculosis and syphilis.

Treatment.—In Lockwood's experience (*loc. cit*), the treatment should be surgical if distress persists in spite of

severed, and the pedicle is oversewed and buried.

The roentgenologist should be present at the operation and be prepared to designate the exact location of the duodenum. In this position, the diverticulum comes off the upper posterior border of the bowel, retroperitoneally, and drops behind the duodenum. The sac should be exposed from above, dissected free, and then removed. While it was suggested that a drain should be left down to the third portion of the duodenum, Lockwood thinks it is unnecessary and should be avoided.

Occasionally, if a duodenal ulcer is present and the sac is on the first portion of the duodenum, it may be advisable, if the sac is small, to rely on a gastroenterostomy to relieve the distress rather than to extend the operation by dissecting out the sac as well.

Patients are immediately relieved of their complaint by surgical treatment. The author has had no deaths, serious

which in postnatal life is located from 8 to 40 inches above the ileocecal valve. While the diverticulum usually presents the structure of the ileum, its mucosa and muscularis are occasionally identical with that of the stomach or the large intestine. It varies in size from a tiny elevation to a pouch $33\frac{1}{2}$ inches long. It is present in 2 per cent of bodies. Many pathological conditions have been



Fig 2—Examples of Meckel's diverticula
(H W Hudson, Jr and L H Koplik New England J Med)

postoperative sequelæ, or recurrences of the diverticula.

MECKEL'S DIVERTICULUM IN CHILDREN—H W Hudson, Jr. and L H. Koplik (New England J Med 206 827 (Apr. 21) 1932) report on 31 cases of Meckel's diverticulum and urge proper evaluation of clinical findings heretofore inadequately emphasized.

Meckel's diverticulum arises from the ileum at a point representing the junction of the superior mesenteric artery and the summit of the loop of midgut,

found associated with it. Among these are acute and chronic diverticulitis, intestinal obstruction, intussusception, acute ulcer with hemorrhage and perforation, volvulus of the diverticulum with or without volvulus of the ileum, congenital umbilical fistula, prolapse of the diverticulum at the umbilicus and neoplasm.

Complications.—In *intestinal obstruction* due to Meckel's diverticulum, it is very important to remember that abdominal distention may be absent, as the obstruction is frequently high in the

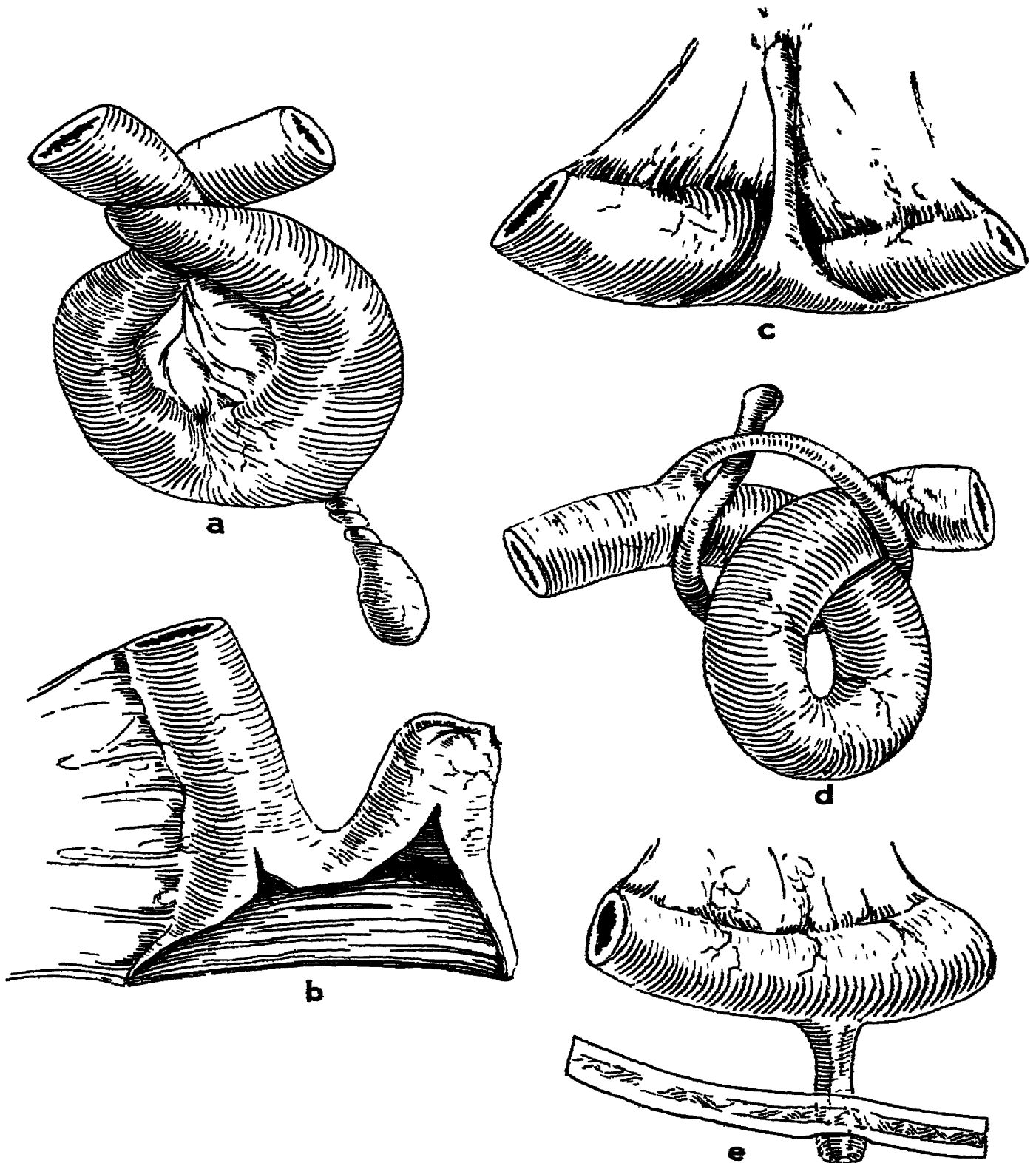


Fig 3—Examples of intestinal pathology arising from presence of Meckel's diverticulum
a, Volvulus of intestine with volvulus of diverticulum, *b*, initiating intussusception, *c*, tip of diverticulum adherent to mesentery with narrowing of ileum, *d*, knot formation, *e*, patent at umbilicus (H. W Hudson, Jr and L. H Koplik, Jr New England J Med.)

intestinal tract Therefore, in the presence of signs of obstruction without distention, operation should not be delayed The association of hemorrhage from the intestinal tract with signs and symptoms of appendicitis may lead to a correct diagnosis The authors emphasize that bleeding from the rectum in acute abdominal conditions is suggestive of pathological changes in Meckel's diverticulum

Of 26 cases presenting symptoms referable to the diverticulum, *hemorrhage from the bowel* occurred with or without other signs in 17 (63 per cent) and was the chief feature in 7 The blood may or may not be mixed with the stool and may be bright red or changed At laparotomy, the terminal ileum should be examined

Invagination of Meckel's diverticulum, according to J C McCann (New England J Med 206 1089 (May 26) 1932) is a rare phenomenon He presents a review of 10 cases reported in the literature, and a case of inversion in which he operated Persistent diverticula, which are found in 2 per cent of necropsies, give rise to diverse complications Intestinal obstruction is the most common and is produced frequently by intussusception of the intestine secondary to invagination of a diverticulum This is the causative mechanism in 7 per cent of obstructing intussusceptions and carries an operative mortality of from 50 to 60 per cent Simple uncomplicated inversion is rare, and in the author's case the serious complication of intussusception was probably averted by the paramesenteric location of the structure, and fortuitous surgical intervention Chronic inflammation had agglutinated the serosal surfaces at the base of this inverted diverticulum, forming a polypus-like

sac within the lumen of the ileum, which produced symptoms of partial obstruction This case presents proof of the hypothesis long held that some polypi of the small intestine take origin from an inverted Meckel's diverticulum

INTUSSUSCEPTION.—*Etiology*—Interesting case reports of intussusception are given by J Voncken, P Moiroud and P Sejournet (Bull et mém. Soc nat de chir 58 49, 1932). Voncken reports the case of a woman with a negative gastrointestinal history who was seized 30 hours before admission to the hospital with violent intestinal pains, vomiting, and slight meteorism Rectal examination revealed nothing abnormal, but on vaginal examination a movable mass was felt in the cul-de-sac The pulse was 100 A diagnosis of volvulus or intussusception was made Incision into the abdomen revealed a small amount of free fluid The intussusception was found and disinvaginated, but its recurrence was favored by active peristaltic movements Palpation then revealed a foreign body in the intestinal lumen, and a small star-like cicatrix was seen on the serosal surface A *pedicled tumor of the intestine* was diagnosed Resection of 15 cm of the bowel was followed by cure The specimen showed an invaginated Meckel's diverticulum turned inside out and drawn down into the bowel lumen

Moiroud reports the case of a patient with a negative previous history who for 2 months suffered intestinal disturbances referred to the right lower quadrant of the abdomen A diagnosis of chronic appendicitis had been made The condition became worse and the patient took laxatives for constipation The laxatives increased the pain Later, an abdominal tumor the size of an orange was palpated to the left of the

umbilicus This was considered to be in the transverse colon and was found to cause partial obstruction X-ray examination showed an abrupt stoppage of the bowel lumen a few centimeters beyond the splenic flexure At operation, the iliac fossa was found empty The intussuscepted cecal head lay at the splenic flexure Excision of half of the colon was done, followed by lateral anastomosis. Pasteur Institute anti-gangrene serum was given Death resulted 4 days after the operation Examination of the specimen showed a *submucous lipoma of the cecum* with some destruction of the mucous membrane, secondary inflammation, and ulceration

Sejournet reported the case of a woman who was seen 30 hours after an acute attack of pain on the right side of the abdomen The patient had passed gas and stools and had not vomited. The pulse and temperature were only slightly increased, and the abdomen was soft and not spastic On vaginal examination, a small, painless, fixed tumor mass was discovered in the right lower quadrant Menstruation appeared at this time after having been absent for 2 months The patient was sent to the hospital and the following night passed several black stools A diagnosis of intestinal tumor was made At operation, an intussusception was resected and the ileum and colon were reunited by lateral anastomosis. Death resulted on the fourth day after the operation Permission for autopsy was not obtained. As a study of the specimen failed to reveal any trace of the appendix or of a newgrowth of the bowel, the cause of the intussusception remained unknown

Diagnosis.—H J Shelley (Arch. Surg 24:318 (Feb) 1932) points out that there are 2 procedures of decided value in the diagnosis of intussusception. If an intussusception is suspected but not felt, either because of the abdominal distention or because of the child's crying, the following procedure will

often result in a positive diagnosis The examiner's right index finger is placed in the child's rectum and his left hand on the abdomen The assistant then holds the child in a sitting posture with its face toward the examiner The tumor will usually drop down between the examiner's hands

When the diagnosis is not certain, or if it is made and the position of the lesion not located, *x-ray examination* is advisable When the condition of the patient calls for as little loss of time as possible, an x-ray of the abdomen made without any preparation will often show the distended loops above the lesion and indicate the position of the intussusception by the difference in the shadow of the large and small intestine

Le Wald has demonstrated graphically the value of the *barium enema* in the diagnosis of intussusception when the patient's condition permits If the obstruction is complete, the site will be shown If it is incomplete, the enema will show the constriction and may show where the barium filters around the invagination and remains after the enema has been expelled from the bowel.

M L Sussman (Am. J Roentgenol 27:373 (Mar) 1932) offers the following as diagnostic criteria in subacute and chronic intussusception (1) obstruction to the passage of barium either given by meal or enema, but not often by both, (2) a filling defect at the site of the obstruction; (3) a palpable mass at the site of the obstruction, (4) a change in the position and shape of the filling defect following defecation, and (5) a compression of the adjacent mucosal folds, particularly well seen in the postdefecation roentgenograms

The x-ray picture supported the diagnosis of invagination in a patient aged 3, reported by E Thomsen (Bibliot. f.

laeger 124 202 (June) 1932) Laparotomy revealed a ring of enlarged lymph nodes about the right flexure of the colon, to which the localized intestinal spasm during the x-ray examination is ascribed. The patient had enteritis with melena. In the second, fatal case, in an infant aged 9 months, with rectal prolapse, the x-ray diagnosis was also misleading. On operation, an ileocecal invagination was found, complicated by fibrous bands encircling various portions of the intestine. After disinvagination, 3 perforations were seen on the intussusception.

Treatment.—Voncken, Moiroud and Sejournet (*loc cit*) discuss the value and findings of *x-ray examination* after a barium enema and the indications for operation. They believe that when disinvagination is possible and there is no ulceration, it should be attempted and supplemented by fixation of the colon. The average mortality of such treatment is a little over 7 per cent. If disinvagination is not possible, the operative procedure must be determined by the conditions found. Resection of the bowel has a high mortality, especially if it is done at the time of the primary operation. Secondary resection after preliminary colostomy is safer. Lateral anastomoses to exclude the intussusception are not recommended.

The author's conclusions are summarized as follows:

- 1 X-ray examination permits a diagnosis in some cases
- 2 The character of the onset does not always indicate the gravity of the condition.
- 3 Treatment in the adult always requires complicated measures
4. Disinvagination should be tried
- 5 Associated pathological conditions should be treated

6 If disinvagination is impossible, resection of the bowel should be done in cases of *intussusception of the ileum*, and exteriorization and colostomy in cases of *intussusception of the ileocecal* portion of the bowel, in the latter, resection and anastomosis are dangerous.

NONOPERATIVE REDUCTION—The reduction of an intussusception, as outlined by Shelley (*loc cit*) may be non-surgical, accomplished by the use of pressure enemas or air insufflation; but if this method is successful, it should be followed by abdominal exploration to make certain that reduction is complete and that there is no gangrene, perforation or tumor present. Both Farr and Montgomery recommend the aid of air insufflation of the colon in the reduction of all intussusceptions at the time of operation. This simplifies the locating of the lesion, reduces the less severe ones without handling of the intestine other than for exploration, and makes possible reduction in some of the advanced cases in which the intussusception otherwise might not be reducible. The procedure should at all times be under visible control. The air empties readily from the rectum.

OPERATIVE REDUCTION—A small, early intussusception is easily reduced and the operative procedure is completed. Also many of the larger, later, and consequently more edematous intussusceptions, may be reduced. Careful manipulation is necessary, as the tissues are very friable. Gentle stripping, rolling or milking back of the intussusciens, while constant but gentle backward pressure is maintained on the apex of the intussusceptum, will usually bring about reduction. McGlannan stated that a flat blunt dissector of the handle of the knife introduced inside of the neck may aid the reduction. If the intussus-

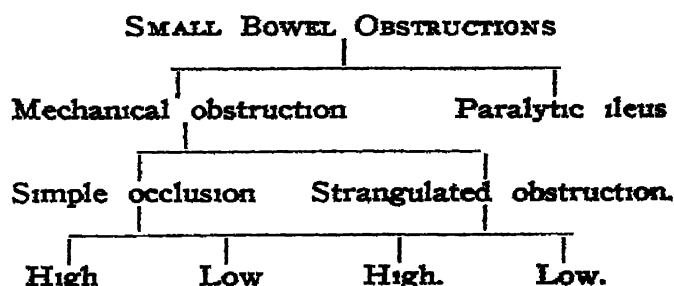
ception is wrapped in moist gauze, and even, steady pressure applied for a few minutes, the edema may be so relieved that reduction becomes possible

The intestines should at all times be protected with gauze saturated with warm physiological solution of sodium chloride, and they should be kept within the abdominal cavity as much as the operative procedures will permit. Cheever advises that, if greatly distended, the intestine be eviscerated into a moist rubber dam bag kept warm by hot compresses to its exterior surface, provided that the distended loops prevent the necessary exploration or operative procedures.

Shelley outlines treatment in irreducible intussusception, gangrenous intussusception and in perforation from intussusception. In a case reported by the author in a child 15 months of age, the intussusception had perforated, was irreducible and gangrenous. It was treated by a modified Mikulicz resection with drainage of the peritoneal cavity. The child was apparently well on the road to permanent recovery when, in the eleventh postoperative week, he contracted whooping-cough from which he died 3 months after the original operation.

INTESTINAL OBSTRUCTION.

Classification.—In a discussion of intestinal obstruction, G. Miller (Canad M A J 26:420 (Apr) 1932) presents the following table in an effort to differentiate its various types:



The author points out that most clinical cases of intestinal obstruction belong to the strangulated variety. Here, loss of vitality of the intestinal wall occurs early, with presumably an early absorption of toxic material. Only early surgical relief will lower the high mortality which occurs generally in this type of case. In simple high obstruction, death is due almost entirely to the loss of sodium chloride in the vomited gastrointestinal secretions which results in marked dehydration.

Etiology.—P. H. Cook and R. P. Watkins (New England J Med 207:462 (Sept 8) 1932) report a case of recurring intestinal obstruction by a *gallstone*. The authors have analyzed reported cases and find that the nature of obstruction was diagnosed before operation in only 1 case. The mortality rate was about 60 per cent. The chief reason for the high mortality was the failure to recognize, not the nature of the obstruction, but the fact that obstruction was present. In most of the cases, this fact was not realized until the condition of the patient was very grave. Cook and Watkins advise immediate surgical measures for relief of obstruction but feel that care of conditions that made obstruction possible be postponed in poor risk patients.

Symptoms.—The symptoms depend upon the portion of bowel involved. The higher the obstruction, the more severe are the symptoms and the graver is the prognosis, in the opinion of I. J. Vidgoff (Am Surg. 95:801 (June) 1932). Obstruction of the small bowel causes paroxysmal cramping or cutting pains with vigorous peristalsis. In obstruction of the large bowel the pain is less severe and more constant.

Vomiting occurred in 95 per cent of the cases reviewed, constipation in 60

per cent, and distention in 45 per cent. In the majority, fever and rigidity of the abdominal muscles were absent. Leukopenia was usually found. Sixty-eight per cent of the patients had had previous operation. Of 104 cases in which x-ray examination was made, the findings by the flat-plate method were positive in 71 per cent.

C F Dixon (New Orleans M and S J 85 87 (Aug) 1932) states that pain of a cramping, colicky nature, vomiting and, later, shock and collapse are the principal features of acute intestinal obstruction. In acute abdominal diseases of an inflammatory nature, tenderness, rigidity, or both, are commonly present. In acute obstruction of the intestine, these signs are usually absent. A flat x-ray of the abdomen in cases of obstruction contains the shadows of the distended, gas-filled, segmented loops. Gas is not normally present in the small intestine in sufficient quantities to cause distention. In pyloric obstruction, the loss of gastric juice seems the chief causative factor for the alterations found in blood chemical values. In intestinal obstruction there is also a loss of gastric juice, but in addition there is apparently a toxic substance, of a protein nature, that is absorbed by the obstructed bowel. In pyloric obstruction, then, toxemia is apparently due to chemical deficiency and in intestinal obstruction, to chemical deficiency together with absorption of toxic substances. The greatest life-saving factor in acute intestinal obstruction is early operation. The author suggests multiple enterostomy.

The *retroperitoneal syndrome* and the relation between *kidney* and *gastrointestinal reflexes* is discussed by L Tixier and C Clavel (Surg Gynec Obst 54 505 (Mar.) 1932). Attention is called

to cases presenting the symptoms of partial or complete intestinal obstruction in which no pathological condition is discovered at emergency operation, and the symptoms are found later to be due to a renal or retroperitoneal condition such as renal calculus, hydronephrosis, hemorrhage or infection. This syndrome is explained by the action on the intestine of inhibitory reflexes arising in the sensory nerves of the kidney, ureter, or posterior parietal peritoneum.

The authors demonstrated the influence of renal and peritoneal stimulation on gastrointestinal motility by placing an exploratory capsule in the stomach or intestine of a dog and then taking kymographic tracings of the contractions following stimulation of the kidney, ureter, or posterior peritoneum. In experiments on guinea-pigs they found that the intestine contracted and dilated segmentally following the retroperitoneal injection of normal saline solution. The reflex is produced usually by way of the solar plexus.

Diagnosis—The *x-ray diagnosis of stenosis* of the small intestine is outlined by E. Piot (Presse méd 40 656 (Apr 27) 1932). For obvious reasons, only partial subacute or chronic obstructions of the small intestine are subjected to x-ray study. The examination is made without preparation or after the administration of a minimal quantity of barium. The information obtained is both physiological and anatomical.

Nearly always there is a pylorospasm which must be considered in judging the rate of passage through the small intestine. Normally, this is 4 hours, with a period of stasis in the terminal ileum of 2 hours.

Early stenosis is revealed clinically by localized pain occurring at fixed times of the day. At this stage the x-ray

shows a slowing of the passage of the barium through the intestine, dilatation, and the presence of gas usually in the ileum

Somewhat later, but even before Koenig's syndrome becomes evident clinically, the barium accumulates above the obstruction and violent peristaltic and antiperistaltic movements can be observed with the fluoroscope. When contracting, the bowel is cord-like and the adjacent loops are dilated. The latter are filled with gas and the outlines of their walls are marked by the barium, which adheres to the mucosa. In the intervals between digestion a large air bubble remains above the constriction.

With the approach of complete obstruction, the musculature becomes atonic, the bowel distends, and peristalsis almost ceases. The abdomen is tympanitic and asymmetrical, and there is a false ascites. At this stage, the examination is usually made without any preparation. It is best to have the patient standing or seated. Numerous large collections of gas are found in the upper abdomen, often disposed transversely and parallel with one another (organ-pipe appearance). Occasionally there is a fluid level which shifts with the patient's movements. When possible, the topography should be determined by the use of an opaque enema or the administration of a small amount of barium in oil by mouth. Stasis of several hours' duration is an indication for immediate operation.

Except in the earliest stages of intestinal stenosis, the diagnosis is obvious and x-ray examination serves only to establish the site of the lesion and to yield some indication of the cause. Tuberculosis produces multiple constrictions, and cancer an obstruction at the ileocecal valve.

Mortality.—I. J. Vidgoff (Am Surg 95 801 (June) 1932) states that very little progress has been made in the last 40 years in reducing the mortality of acute intestinal obstruction, the average mortality still being between 40 and 60 per cent. Of 266 patients whose cases are reviewed by Vidgoff, 90 per cent were admitted to the hospital after the symptoms had begun and 10 per cent developed intestinal obstruction while they were under observation in the hospital. In the latter group, the mortality was 10 per cent, higher than the general average of 45.9 per cent.

The types of obstruction and the number of cases and mortality of each type are shown in the following table:

Type	Cases	Mortality, Per Cent
Adhesions	170	37.6
Hernia	49	60.0
Cancer	22	68.0
Gall-stones	4	25.0
Intussusception	11	66.0
Volvulus of sigmoid	4	75.0
Meckel's diverticulum	2	None
Diverticulitis	2	100.0

Treatment.—Hypochloremic conditions and replacement of the chlorides by intravenous injections of sodium chloride are discussed by A. Pierini (Semana méd 1 378 (Feb 4) 1932). The first studies of chloride deficiency in intestinal obstruction were made in North America. Experiments carried out on dogs by Tibeston and Comfort in 1914, MacCann in 1918, MacCallum in 1920, and Hastings and Murray in 1921, demonstrated a marked decrease in the chlorides of the blood and an increase in the nonprotein nitrogen and the alkali reserve in this condition.

In 1923, Haden and Orr, Brown, and Hartman and Rowntree reported beneficial effects in clinical cases from the subcutaneous or intravenous injection

of a solution of sodium chloride. In 1927, Gosset, Binet, and Petit Dutailis concluded that the intravenous administration of a hypertonic solution of sodium chloride is of indisputable value as a preventive as well as a therapeutic measure for the intoxication due to obstruction of the digestive tract

It is recognized that intestinal obstruction is always accompanied by a humoral syndrome characterized by (1) an increase in the nonprotein nitrogen, (2) an increase in the alkali reserve, (3) hyperglycemia, (4) polycythemia, (5) a transient leukocytosis, (6) an increase in the fibrin and viscosity of the blood, and (7) a decrease in the blood chlorides, the hypochloremia of Haden, Orr and Binet

Studies in clinical cases and on animals demonstrate that the fall in the blood chlorides is least in occlusions of the esophagus and the cardiac end of the stomach and greatest in obstructions of the pylorus, duodenum, jejunum, and first part of the ileum. In obstructions of the terminal ileum and the large bowel it is almost negligible

In the opinion of Braun and Barutton, the hypochloremia is of neurogenic origin. Khantz and MacClur believe that it is of bacterial origin, whereas Roger, Garnier, Wipple, and Gerard attribute it to an autointoxication caused by the absorption of toxic products from the obstructed portion of the gastrointestinal tract

In the presence of volvulus, which is associated with damage to the bowel wall, autointoxication predominates, whereas in simple intestinal occlusion without damage to the bowel wall, autointoxication does not occur. In both conditions, however, there is a loss of chlorides. The author, therefore, believes that in simple occlusion without

damage to the bowel wall the principal cause of death is the disturbance of the equilibrium of the body fluids resulting from the loss of blood chlorides

From the point of view of treatment, it is important to bear in mind that there is a great difference between obstruction with damage to the bowel wall, in which there is less danger, as the disturbance of equilibrium of the body fluids can be corrected by intravenous or subcutaneous injections of a hypertonic solution of sodium chloride

The amount and concentration of the salt solution employed must be determined for each case. Pierini reviews the indications for the treatment and warns of the complications which may occur if the concentration of the solution is not correct and the fluid is injected too rapidly

The rôle of bile in *high intestinal obstruction* is outlined by E. B. Benedict, C. P. Stewart and P. N. Cutner (Surg Gynec Obst 54 605 (Apr) 1932). In experiments carried out by the authors on dogs to determine the part played by bile in high intestinal obstruction, the intestines were obstructed at various levels from just below the bile and pancreatic ducts to 11 inches below this point. Some of the animals then received normal saline solution and bile collected from a dog with a permanent cholecystostomy, and others, by a preliminary cholecystenterostomy with ligation of the common bile duct performed a week or more before the intestine was obstructed, received their own bile below the level of the obstruction. Control animals with similar obstructions received saline solution only. Nothing was given by mouth except a very occasional sip of water. Saline solution, or saline solution and bile, was given twice a day through an enterostomy

The authors concluded that when the obstruction in the intestine was so high that no bile could be reabsorbed, some benefit was derived from the administration of bile below the obstruction. While the experiments appeared to indicate that, in dogs, a lack of bile in the segment below the obstruction was not a factor of fundamental importance in the fatal outcome, they did not preclude the possibility of benefit from the use of bile in the lower bowel in the human subject suffering from paralytic distention. The composition of bile with regard to bile salts and cholesterol was apparently not altered by the intestinal obstruction. When the chloride and water balance was maintained, the survival period of the dogs with intestinal obstruction seemed to depend almost entirely on the level of the obstruction below the bile papilla and the fat reserve.

Treatment of Postoperative Obstruction.—According to Donald Guthrie (Pennsylvania M J 35 376 (Mar) 1932), the modern preparation for operation and modern operative technic have greatly reduced the mortality and morbidity of abdominal operations, but postoperative ileus is still a cause of postoperative death.

Both dynamic and adynamic ileus may be the result of prolonged operations, carelessly induced anesthesia, rough handling, loss of heat, time, and fluids, and the leaving of unperitonized surfaces in the abdomen. *To reduce trauma*, rough gauze dissection should be abandoned in favor of *sharp dissection*. In pelvic operations the induction of *anesthesia* should be begun with the patient in a high Trendelenburg position, so that by the time the abdomen is opened, the pelvis will be nearly freed of loose intestinal coils. The use of large

quantities of gauze should be avoided. Frequently, the end of a square of gauze in the upper angle of the wound is sufficient.

In cases in which **spinal anesthesia** can be induced, the resulting relaxation of the abdominal wall and collapse of the small intestine are of great aid in procuring adequate exposure. Trauma to the small intestine, particularly the upper part, is one of the most common causes of postoperative ileus.

In *postoperative adynamic ileus* the symptoms are often indefinite and it is frequently difficult to distinguish the condition from mechanical ileus low in the intestine and beginning peritonitis. The patient is often of the neurotic type who does not withstand physical or psychical trauma well. There may have been some unusual degree of operative trauma and some postoperative shock. During the day following the operation the patient is restless and has an anxious expression. The pulse is rapid, the abdomen is distended and silent, and regurgitation of gastric and duodenal contents is noted. In some cases the ileus is self-limited and subsides in from 24 to 48 hours.

The administration of fluids in large quantities is imperative. From 5 to 6 liters (quarts) of water should be given every 24 hours. An *inlying nasal catheter* or frequent gastric lavage through a Levine tube will keep the stomach free from gas and secretions. The application of heat to the abdomen and strong psychical support are important. Frequent auscultation is necessary, as a peristaltic sound may forecast improvement.

Bartlett's method of using spinal anesthesia postoperatively is advocated as the best means of distinguishing between dynamic and adynamic

ileus The spinal anesthesia is induced with the patient in bed, but with the operating room ready If a bowel movement is not obtained within 15 minutes the patient is moved to the operating room and an enterostomy or a more radical procedure is carried out The use of pituitrin is to be condemned A greatly distended small intestine is unable to contract even after removal of the inhibitory control by the induction of spinal anesthesia and, therefore, requires enterostomy. Sometimes multiple enterostomies are necessary

Dynamic ileus is easier to recognize than adynamic ileus, as it is usually preceded by an inflammatory lesion or an operation in which an unperitonized surface is left When the obstruction is in the upper half of the intestine, there is little distention, but early vomiting and regularly recurring cramp-like pains are characteristic Auscultation reveals exaggerated peristaltic sounds and the recoil of trapped gas and fluids during periods of pain Careful inspection may disclose the presence of intestinal patterns, pathognomonic evidence of obstruction.

Barium given by mouth is dangerous and its administration by enema is of little value and causes dangerous delays An x-ray of the abdomen without the use of an opaque substance may yield valuable information. In obstruction of the small intestine it shows a collapsed colon and parallel coils of distended small intestine in the herring-bone pattern of Kerkring's folds

Morphine should be withheld until the diagnosis is established and arrangements have been made for operation

The passage of gas with an enema is misleading as the gas comes from the part of the intestine below the obstruction Purgatives only serve to increase

the rapidity of reverse peristalsis The results of delay in operation are increasing distention, a fast pulse, a leaky skin, a fatally silent abdomen, and fecal vomiting, all signs of impending death

Operative treatment depends on the promptness of diagnosis and the general condition If an obstruction of the upper or midportion of the intestine is diagnosed early, when there is little distention and the patient is in good condition, the incision may be reopened and the mechanical obstruction corrected When there is more marked distention and the general condition is less favorable, enterostomy, single or multiple, is necessary When there is widespread early infection, a complemental enterostomy is often indicated

Holden's method of evisceration with direct emptying of the distended coils is held to be dangerous In the presence of *strangulation*, enterostomy may save the life of a very ill patient and be followed by sufficient improvement or permit resection of the strangulation

Salt solution should be given in large quantities Hypertonic salt solution stimulates peristalsis and may aid in stimulating the distended bowel

A left *rectus incision* from the costal arch downward for 6 cm is usually sufficient except in the cases of patients with a large amount of subcutaneous fat The omentum, if it cannot be pulled upward, may be split in an avascular area The rectal tube should be inserted with the tip downward in order to take advantage of the reverse waves Side openings in the tube are of aid in procuring free drainage The direction of the intestinal tube can be ascertained by following the root of the mesentery, the hand inevitably being guided into the corresponding fossa of the same side If drainage ceases, hourly irrigation of

the enterostomy tube without pressure is advisable. Constant attention to the tube is necessary to determine whether drainage is sufficient.

TUBERCULOSIS OF INTESTINE.—*Treatment.*—Surgical tuberculosis of the intestines is discussed by F. Melina (Ann ital di chir 11 233 (Mar 31) 1932), who reports 3 cases representing 3 types of the condition, *i e*, the hypertrophic, the ulcerative, and the cicatricial. He states that the *hypertrophic type* is often primary in the ileocecal region (tuberculous perityphlitis) and when possible should be treated by intestinal resection. In the *ulcerative type*, surgical treatment will not effect an absolute cure, but often causes noteworthy improvement. In the *cicatricial type* found in the transverse colon, extensive resection of the bowel is not advisable, as better results may be obtained by a simple short-circuiting anastomosis of the colon.

In the author's opinion, ileocecal and ileocecolic resection should usually be performed in one stage. The speed with which the operation may be performed may be increased and the danger of sepsis decreased by the use of the von Petz apparatus.

A novel method of perineal ileostomy for *multiple abdominal fistulas* and *sinuses* following operation for appendiceal and intestinal tuberculosis is described by W. W. Babcock (Surg Clinics North America 12 1387 (Dec) 1932). The author reports the case with outline of technic of the operation as follows:

A man, aged 23 years, occupation knitter, in May, 1930, after 2 years of pain in the right lower quadrant, had an operation for a ruptured appendix. Although the wound healed, the pain continued, and in December, 1930, an abscess in the region of the scar was opened. The wound did not heal and

later it was observed that feces were escaping. In June, 1931, the patient came to the hospital for the chronic cecal fistula. He was thin and cachectic. On June 16, under spinal anesthesia, the fistulous tracts were delineated by a solution of methylene blue, excised and the open head of the cecum resected and sutured. Five days later the wound reopened with the formation of a larger cecal fistula. A blood transfusion was given on July 15. On September 30 and October 26, multiple purulent sinuses which formed on the abdominal wall were freely opened and drained. As the patient refused most of his food, forced liquid feedings were instituted with the nasal tube.

By January, 1932, the patient's general condition was somewhat improved, but the fistulas and sinuses continued to be very troublesome. On January 22, the abdomen was again opened and many tuberculous plaques were found upon the lower ileum and ascending colon. An ileocolostomy with exclusion of the proximal half of the colon was performed. The wound suppurated with the formation of a second fecal fistula and the patient experienced much pain from peristaltic movement, evidently associated with a partial intestinal obstruction. The patient's condition was desperate and it was evident that none of the conventional forms of intestinal anastomosis would succeed. Therefore, on April 6, 1932, the abdomen was reopened, the ileum separated from the transverse colon, and the end closed and enclosed in a Penrose rubber drain. A wide gauze tape was tied about the free ileum, the ends of which were carried through a peritoneal opening in the retrorectal pouch to the floor of the pelvis where the gauze was packed. The open end of the transverse colon was brought out through the abdominal incision. After closing the abdomen, an incision was made in the perineum from the posterior margin of the anus through the pelvic floor where the gauze packing was located and withdrawn with the rubber encased end of ileum. The rectum having been cleansed, a buttonhole opening was made through its posterior wall just above the internal sphincter and the closed end of the ileum pulled through the dilated anus, and a rectal tube tied into the protruding bowel. As a poorly draining perineal abscess later formed, the sphincter was divided on April 19, 1932.

Babcock points out that the chief problem with an ileostomy in the perineum is the *prevention of skin irritation*. In the early weeks, frequent liquid discharges of a very irritating character may give the patient great annoyance. Two methods of treatment he

a varnish of concentrated compound tincture of benzoin, and then dredge the part with stearate of zinc powder. The application of metallic copper powder attached to the skin by means of a sticky size or varnish has recently been advocated by Cunningham but



Fig 4—Perineal ileostomy. Ileum in rubber encasement pulled through buttonhole in rectum (W W Babcock Surg Clinics of North America)

found of value. The first is to apply to the perineum compresses of dilute lead water containing 1 or 2 per cent of phenol. A protective precipitate is deposited upon the skin which, if properly cared for, will prevent serious excoriation or ulceration. A second method, perhaps more effective, is to cleanse and dry the skin, paint it with

seems to be less effective. After some weeks, an adjustment of water absorption apparently takes place, the discharges from the ileum become less frequent and more solid, and the ileal opening may give very little trouble. The desirability in this patient of later enucleating the section of excluded colon has yet to be determined. As long as

the retained bowel continues to give the patient little or no trouble, Babcock does not advise its removal

TUMORS OF SMALL INTESTINE.—The occurrence of 2 cases in Johns Hopkins Hospital, followed by the report of 3 others in other Baltimore hospitals, caused T S Raiford (Arch Surg 25 122 (July), 321 (Aug) 1932) to become interested in the study of growths in the small intestine. A search of the material has revealed 88 cases of tumors of the small bowel on record. The scarcity of such tumors will be realized when it is stated that 89 per cent of all gastrointestinal tumors are those of the small intestine

Tumors of the *lymphoblastoma* group were most common, occurring in 21 instances, 18 being located in the terminal ileum. *Carcinomata* were next in frequency, accounting for 16 of the 88 cases. The duodenum was most frequently involved, 8 cases, while the jejunum and ileus had 4 and 3 cases, respectively

A diagram indicating the location of the tumors reveals that both benign and malignant growths are found more frequently in the terminal ileum. The duodenum is next in frequency and the jejunum free

Discussing the general type of tumors, the external or extraluminal type is comparatively rare, while the vast majority of the tumors, especially the benign one, are of the internal type. The constricting type of growth is a variation of the infiltrative form described by the author.

Carcinomata comprised 18.1 per cent. of the 88 tumors in this series. This type of tumor was found in the duodenum more frequently than elsewhere, in spite of its short length. The papilla of Vater is the site most commonly at-

tacked. The gross forms may be divided into the constricting or stenosing type, the infiltrating ulcerative type and the polypoid form. Four types of carcinoma are found, the adenocarcinoma, medullary, scirrhous and colloid

Sarcomata are found rarely in the small intestine. Two cases are reported in this series, one of the spindle cell variety and the other a myosarcoma. The ileum is the most common site and the tumors are of the external type and do not metastasize as readily as carcinoma. The myosarcoma arises from muscle tissue and is frequently confused with the spindle cell variety of fibrosarcoma.

No group of tumors exists upon which there is more confusion concerning nomenclature and classification than the *lymphoid tumors* of the small intestine. They have been discussed in the literature under the names of lymphosarcoma, sarcoma, lymphocytoma, Hodgkin's disease, chronic inflammatory tumors, pseudoleukemic granuloma, lymphoid granuloma and many others

Twenty-one of the 88 cases were *lymphoblastoma*, found in the terminal ileum. Nonspecific *granulomas* are most frequently found as inflammatory thickenings, polypoid growths or fungating masses in the lower ileum, rarely of the constricting form. The predominating cell is the small round cell

The *reticulum cell sarcoma* takes its name from its origin in the reticulum cells of the primordial follicles and cords. *Malignant lymphocytoma* is most commonly found confused with lymphosarcoma. The predominating cell closely resembles the large lymphocyte

Endotheliomata must be considered from the possibility of their origin in the endothelial cells of the lymph nodes.

These again are found in the terminal ileum

Of the benign tumors, the *adenoma* is the one most commonly observed. It seldom causes obstruction and the majority are only recognized at autopsy. They comprise a large part of the group classed as polyps or papillomas. Two theories of origin are considered (1) that they are inflammatory in nature, and (2) that the tumor is the result of a primary epithelial change. *Myomas* are an occasional inhabitant of the small intestine and are thought to arise from either the intestinal or external layers of the bowel or the muscularis of the arterioles. Pure *fibromas* are among the rarest tumors found in the upper bowel, but the mixed forms are much more common.

The *aberrant pancreatic rest* is a type of benign tumor occasionally seen in the small intestine, they rarely produce symptoms but are observed at autopsy. Microscopically, they are the same as normal pancreatic tissue except for the distribution.

True *angiomas* of the small bowel are extremely rare. *Hemangiomas* are of 2 types, the simple form consisting of hypertrophy and overgrowth of the small blood-vessels, and the cavernous type which shows large blood-filled cavities and sinuses.

Lipomas are frequently found as small soft yellow nodules on the wall of the intestine and are usually observed at autopsy. They are of minor clinical significance, because the slow growth and the pedunculated nature of the tumors predispose them to separation from the intestine and passage per rectum.

Rare tumors discussed in brief by the author are *enterocysts*, *cystic pneumatosis*, *neuroblastomas*, etc.

Secondary tumors of the small intestine are discussed by the author because of the interest they arouse by stimulating primary growths. This part of the gastrointestinal tract is very susceptible to the implantation of the metastatic nodules of primary growth in some other part of the body. The stomach is the most common primary site for the malignant growth. The pancreas and uterus follow closely in frequency.

The clinical recognition of tumors of the small intestine, with all the diagnostic aids available, is still quite a difficult task. The symptoms simulate other abdominal conditions and it is seldom that a correct preoperative diagnosis is made. Symptoms and signs are usually brought about by the mechanical condition produced by the tumor and to a lesser degree by the constitutional effects of the tumor.

SURGERY OF INTESTINES.—

A new method for *aseptic anastomosis* of the intestines by electrosurgery is described by J. E. Briggs and L. R. Whitaker (New England J. Med. 206:662 (Mar 31) 1932). It consists essentially in devitalization by fulguration of an area the size of the proposed stoma on either end or side of the intestine to be joined, followed by careful approximation and fixation with a double row of mattress sutures. The advantages are ease of execution, reduction of trauma and danger of contamination to a minimum, and accurate coaptation of the joined edges without excessive infolding. The only disadvantage is blockage of the intestine for from 12 to 24 hours until the devitalized "button" sloughs out. Since, however, in obstructive cases enterostomy or colostomy should always be performed, there is no real objection on this ground. Experimental results have been excellent.

The use of *enterostomy* as a *life-saving measure* is outlined by W. W. Bowen (J Iowa M Soc 22 205 (May) 1932). He uses it in all suppurating conditions in the abdomen when there is actual or threatened peritonitis; in all cases of ruptured duodenal ulcer, ruptured gall-bladder, septic appendix, or pelvic infection, when he also finds evidence of peritonitis, distended intestine, or an inflamed, angry-looking intestine; also he uses enterostomy as a preliminary procedure when there is a malignant tumor to be removed later.

An enterostomy does a good many things that nothing else will do: (1) it rapidly drains out any toxins that may be in the intestine, (2) it allows fluids and gases in the intestine to escape and so prevents distention or reduces any distention that may be present, (3) it allows the intestine distal to the enterostomy to rest, so that, if peritonitis has begun, the rest permits recovery if it is not too far advanced, and, if peritonitis has not begun, there is little chance for it to start, (4) it allows the immediate giving of water. There is an exit for gas and for fluids and usually the patients do not vomit from taking water; (5) it allows the immediate pouring of liquids into the intestine at the place where absorption is most active, *i.e.*, the jejunum.

IODINE.—PHYSIOLOGICAL ACTION.—The *absorption* of iodine from the gastrointestinal tract was investigated by B. N. E. Cohn (Arch Int Med 49.950 (June) 1932) who reports studies on the absorption of free iodine in aqueous solution, of diluted compound solution of iodine and of potassium iodide and potassium iodate from the gastrointestinal tract of the dog. These studies show that the iodine is

converted to the iodide before it is absorbed. If these studies are applicable to the human being, they would seem to refute the assertion that compound solution of iodine is more beneficial than potassium or sodium iodide in controlling the high basal metabolism of exophthalmic goiter, since, when compound solution of iodine is used, the percentage of iodine absorption is no greater than when potassium or sodium iodide is administered.

A. B. Gutman, E. M. Benedict, B. Baxter and W. W. Palmer (J Biol Chem 97:303 (July) 1932) describe a procedure for the partition of the known iodine compounds of the thyroid, based on the method of Leland and Foster for the determination of total iodine, and aqueous extraction of the desiccated gland for estimation of inorganic iodine. The data derived from this procedure on 117 pathologic thyroids obtained after thyroidectomy and on 20 normal glands are presented. Comparison of the results on 70 thyroids of patients with *exophthalmic goiter* who had received iodine, with the data in the literature on thyroids of untreated patients with exophthalmic goiter, suggests the following changes as a result of iodine administration: (1) an increase in the total iodine content of the gland, due to an increase in both the inorganic iodine and thyroglobulin iodine fractions; (2) a change in the chemical nature of the thyroglobulin as evidenced by an increase in the thyroxine iodine percentage of thyroglobulin iodine and a consequent decrease in the percentage of thyroglobulin iodine not in the form of thyroxine but chiefly or entirely as diiodotyrosine; (3) an increase in the relative and absolute thyroxine and diiodotyrosine content of the gland. Comparison with the

data on normal glands suggests to the authors that these changes constitute a return from the more or less depleted state of the untreated exophthalmic gland toward that of the resting gland

Chronic lymphatic leukemia is usually associated with an elevation of the basal metabolic rate. Because of the depressing effect of iodine on the basal metabolic rate in exophthalmic goiter and such conditions as pernicious anemia, acromegaly, and polycythemia, H B Friedgood (Am J M Sc 183:515 (Apr) 1932) studied the effect of Lugol's solution on the basal metabolic rate, clinical picture, and laboratory findings in 10 cases of chronic lymphatic leukemia. In all of these cases there was a definite elevation of the basal metabolic rate, but the basal pulse rate was not materially increased. The physical signs and clinical symptoms of the disease were qualitatively similar to those of exophthalmic goiter although less marked. This fact suggested that the fundamental disturbance in both of these conditions is a hyperactivity of the sympathetic nervous system.

The administration of Lugol's solution produced a response similar to that seen in exophthalmic goiter, but the percentage frequency of the response was somewhat lower. The effects included

a temporary decrease in the basal metabolic and pulse rates, and a reduction of the nervous manifestations, the size of the lymph nodes, and the total leukocyte count. In some cases the Lugol's solution seemed to increase the hemorrhagic tendency and to lower the erythrocyte count and the hemoglobin. Occasionally there was a paradoxical response with exaggeration of the sympathomimetic symptoms. The author concludes that exophthalmic goiter is not a disease of the thyroid gland, but primarily a disturbance of the sympathetic nervous system.

IRIS.—INNERVATION.—From an experimental study of the innervation of the iris M Rischard (Ann d'ocul 169:464 (June) 1932) concludes that the oculomotor nerve has no direct action on the iris. When sympathetic innervation is experimentally eliminated, the iris fails to respond to any stimulus. The oculomotor nerve can, therefore, act on the muscles of the iris only through the sympathetic nerve. He believes that the iris contains a single muscle innervated directly by the sympathetic nerve and that the oculomotor nerve acts indirectly by inhibiting the action of the sympathetic. This action is analogous to the nervous mechanism of the urinary bladder.

J

JAMAICA GINGER (TRIORTHOCRESYL PHOSPHATE) PARALYSIS.—D H Werden (Ann Int Med 5:1257 (Apr) 1932) reports his observations from a clinical study of 50 cases of ascending paralysis resulting from the drinking of Jamaica ginger. The difference in the findings

in this series from those previously reported by others are particularly emphasized. The writer concludes that the disease can be definitely diagnosed on the physical findings alone and that the history is often unreliable and relatively of little importance. The flexors of the extremities are affected almost equally

with the extensors and sensation is seldom disturbed. In his opinion, the lesion in Jamaica ginger paralysis is more than a neuritis. Clinical and pathological findings indicate that the process is an ascending degeneration, the extent of which is proportional to the amount of the chemical absorbed from the intestinal tract, and is manifest clinically by changes in the motor power of the extremities and in the various deep and superficial reflexes. Although the impairment of vision is not elicited subjectively, the disease frequently delays the pupillary light reflex, often produces irregularity of the pupils, and occasionally gives an optic neuritis.

In a detailed description of *polyneuritis* resulting from triorthocresyl phosphate, B. T. Burley (J. A. M. A. 98: 298 (Jan 23) 1932) emphasizes that the symptom complex is so clean cut that it may be differentiated from every other disease of the central or peripheral nervous systems. The pathology corresponds to the clinical signs showing focal myelin sheath and axis cylinder degeneration especially of the anterior tibial, external popliteal, radial and ulnar nerves. Less definite changes have also been found in the spinal cord, medulla and pons. The author stresses the fact that the *prognosis* should be guarded for complete recovery in severe cases, since improvement will be gradual and, in the legs, long deferred.

ETIOLOGY.—Chemical and pharmacological studies by M. I. Smith and E. Elvove (J. Med. 13: 11 (Mar) 1932) as to the etiological factor in so-called Jamaica ginger paralysis indicate that the phenolic substance in the suspected ginger is a stable combination of phenols, probably in the form of a phosphoric acid ester or some related substance, which resists hydrolysis and

requires drastic treatment with alkali and heat to effect complete saponification. The authors state that, barring the remote possibility of some of the other ginger constituents or some impurity in the technical tricresyl phosphate having something to do in a supplementary manner with the paralytic disease, it appears almost certain that the cresol-phosphoric acid-ester is the etiologic factor of the epidemic of so-called ginger paralysis.

PATHOLOGY.—A comprehensive study of the histopathology of triorthocresyl phosphate poisoning (Jamaica ginger paralysis) was carried out by M. I. Smith and R. D. Lillie (Arch. Neurol. and Psychiat. 26: 976 (Nov) 1931). The results indicate that the multiple neuritis of this paralysis is essentially a degeneration of the myelin sheaths of the peripheral nerves, with a variable amount of relatively moderate central degenerative changes affecting the anterior horn cells throughout the spinal cord, but more often in the lumbar and cervical regions. Essentially similar lesions were observed in experimental animals in which partial paralysis was produced by means of triorthocresyl phosphate.

JAUNDICE.—PATHOGENESIS.—According to J. F. Weir (Am. J. Surg. 15: 494 (Mar) 1932) jaundice develops in 3 principal ways: from production of more bilirubin than can be excreted by the liver, from biliary obstructive lesions; and from some derangement of the polygonal liver cell interfering with excretion of bilirubin.

DIAGNOSIS.—Laboratory findings are of considerable aid in classifying jaundice, the following procedures being suggested: determination of the type of van den Bergh reaction; deter-

SERUM BILIRUBIN IN VARIOUS TYPES OF OBSTRUCTIVE JAUNDICE.

Serum Bilirubin, Mg in Each 100 Cc	Stone in Common Bile Duct (102 Cases)		Stricture of the Common Bile Duct (46 Cases)		Carcinoma of Pancreas (36 Cases)		Carcinoma Gall-bladder and Ducts (16 Cases)		Cholecystitis with Stones (24 Cases)		Intrahepatic Jaundice (100 Cases)	
	Cent	Per Cent	Cases	Per Cent	Cases	Per Cent	Cases	Per Cent	Cases	Per Cent	Cases	Per Cent
1 to 5 . .	42	41	20	43.5	4	11	1	6	8	33.0	18	18
6 to 10 . .	30	29	14	30.5	5	14	3	19	6	25.0	27	27
11 to 15 . .	21	21	7	15.0	8	22	4	25	5	21.0	18	18
16 to 20 . .	8	8	3	7.0	12	33	8	50	2	8.5	11	11
21 to 25 . .	1	1	1	2.0	5	14			2	8.5	9	9
26 to 30 . .			1	2.0	1	3			1	4.0	4	4
31 to 35 . .											4	4
36 to 40 . .											4	4
41 to 45 . .					1	3					4	4
46 to 50 . .											3	3
											2	2

mination of the height and behavior of the curve of serum pigment as determined by the icterus index or the van den Bergh test, determination of the quantity of bile reaching the intestine by duodenal drainage, and clinically the determination of the presence or absence of pain. The most useful laboratory tests are those which aid in determining (1) the type of jaundice, hemolytic, obstructive or hepatic, or a combination of types, (2) the reserve capacity of the liver to withstand surgery, (3) the prognosis in hepatic icterus, and (4) the most favorable time for operation.

In Weir's experience the *van den Bergh test* has given more valuable information than any other. It is especially valuable as a measure of serum bilirubin although the qualitative test may occasionally be of assistance. In an analysis of 224 cases of obstructive jaundice and 100 cases of hepatic jaundice it was found that in the former the bilirubin reading was usually less than 10 mg, while a reading of more than 30 mg was presumptive evidence of hepatic jaundice. In obstructive jaundice a reading of 15 mg or more was usually

indicative of some degree of intrahepatic icterus.

Daily determinations of *serum bilirubin* are of considerable prognostic importance. In obstructive jaundice a declining bilirubinemia indicates a favorable course and greater surgical safety, while a rising curve argues for delay in surgery. Sudden variations usually indicate an intermittent obstruction, usually stone. In hepatic types, the higher the bilirubinemia, the more serious the hepatic damage, as a rule. Especially is this true if the level remains high for some time.

Dye excretion tests are of little value in jaundiced patients, since the dye retention roughly parallels the degree of icterus. Coagulation time and sedimentation rate are not tests of extreme value in jaundice. The former is not an index of the tendency of icteric persons to bleed in most instances. Urobilin and urobilinogen determinations are not of great value in jaundiced patients. Tests of lactic acid and sulphates in the blood have proven of little value. Determination of blood fat was made in 48 cases of jaundice. No correlation was possible between these figures and the cause

of the icterus. Fat figures were usually elevated in obstructive jaundice, but not uniformly so. Sugar tolerance tests have not proved of great value in the author's experience. Analysis of guanidine in the blood has likewise failed to give helpful information. *Duodenal drainage* used to estimate the degree of obstruction has been of considerable aid in diagnosis and prognosis.

From a clinical standpoint an analysis of the *pain* is of significance. In 275 cases of jaundice reviewed by the author, 104 presented stone in the common duct. Colic was associated with the onset of icterus in 80, while a painless onset was noted in 19. In 49 cases of benign stricture, colic occurred in 22 instances. Five histories of colic were obtained in 38 cases of pancreatic neoplasm, while the jaundice was painless in 19. Colic also occurred in 12 of 38 miscellaneous cases, including cholangitis, hepatitis, cirrhosis, etc.

The *differential diagnosis* of *painless jaundice* may be extremely difficult. In young persons painless icterus is usually hepatic in origin. In old people malignancy must be considered, especially if other findings such as a palpable gallbladder or a nodular liver are present. Painless jaundice occurring shortly after operation suggests stricture. The presence or absence of itching does not seem to indicate the type of icterus.

Galactose Tolerance Test.—In discussing the value of the galactose tolerance test in the differential diagnosis of jaundice H. Shay and E. Schloss (J. A. M. A. 98:1433 (Apr. 23) 1932) emphasize the difficulty of interpreting

any liver function test in view of the organ's multiplicity of function and great regenerative and reserve capacity. Previous studies have shown galactose to be the best-suited sugar for testing the carbohydrate function of the liver, according to the authors. A normal liver has been found to utilize 37 to 40 Gm. of this sugar, that not utilized being excreted by the kidney, which has no threshold for galactose. Urinary excretion of more than 3 Gm. of galactose after oral administration of 40 Gm. is considered positive evidence of hepatic cell damage. Apparently only severe diffuse liver cell injury gives a positive test, hence its use in jaundice to differentiate hepatic icterus from the obstructive and hemolytic types seemed promising.

The present paper is concerned chiefly with the diagnosis of the cause of painless jaundice, including so-called catarrhal jaundice, silent common duct stone, carcinoma of the head of the pancreas, or chronic pancreatitis. The importance of correct diagnosis and early therapy in these cases is widely accepted.

The authors report 4 case histories showing the value of the galactose test, and conclude that the "galactose tolerance test is a simple ready means of identifying a clinically difficult group of cases, namely, the toxic or infectious jaundice group, and of separating it from the obstructive type, which frequently masquerades in identical symptomatology. Particularly is this true in the cases seen in middle and later life, when the consideration of malignancy is always looming in the foreground."

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KIDNEY. —PATHOLOGY.—Insufficiency of the liver is objectively manifested by the appearance of ketone bodies in the urine. L. Stropeni (Boll mem Soc piemontese di chir 11 554 (May 14) 1932) studied both the acetone content of the urine and the ketone bodies of the blood. Normally, the blood contains ketone bodies to the amount of from 13 to 25 mgs per 100 cc. After biliary surgery there is a slight increase in the ketone bodies corresponding to the amount of acetone in the urine. When there is a decrease in the elimination of the acetone, there is a progressive increase in the ketones in the blood. In regard to ketone bodies, the kidneys may be divided into 3 groups. (1) normal kidneys with great reserve power; (2) kidneys apparently normal but having only slight reserve, and (3) kidneys without reserve power with already altered function. The behavior of renal function observed in respect to the elimination of nitrogen corresponds perfectly to that of the kidneys in the presence of toxic substances such as ketones. The author concludes that the cause of every accident in cases of postoperative functional insufficiency of the liver can be traced to the kidneys.

DIAGNOSTIC MEASURES.—R. Roth (Ztschr f Urol 26:182, 1932) suggests a simple method for the *localization of suppuration* of the urinary tract. He has the patient evacuate the bladder into 2 or 3 glass receptacles. If these specimens do not indicate definitely the origin of the pus, the bladder is irrigated with sterile water until the fluid is clear. Then the bladder is completely evacuated. The catheter is left in place and is closed for several minutes for the collection of a new specimen.

If this specimen contains pus, it is evident that the infection is coming from the upper urinary tract.

Kidney Function Tests.—*Phenolsulphonphthalein Test*—J. P. Hanner and G. H. Whipple (Arch Int Med 48:598 (Oct) 1931) experimented with dogs and found that when necrosis of the liver was produced by *chloroform poisoning* the elimination of phenolsulphonphthalein by the normal kidney rose to 90 to 97 per cent, with the repair of the hepatic injury it returned to normal. Experimental biliary obstruction also caused a definite increase in the renal elimination of the dye. The authors report that with any disturbance of biliary function, an avenue for liberation of the dye is by way of an increased output in the urine. There is no evidence to assume that a cholagogue increased the elimination of the dye either in the normal dog or the one with a biliary fistula.

From their own findings and the observations of others, the authors conclude that the elimination of the dye by the liver and the kidney under the conditions cited is the same in the dog and in man. Clinically, an unusually high renal elimination of the dye should suggest definite changes in the liver. Combined renal and hepatic disease calls for caution in the interpretation of the renal elimination of the dye.

A study of 25 cases of *exophthalmogoniter* and 21 of *myxedema* by J. Lerman and A. J. Brogan (Endocrinology 16:251 (May-June) 1932) with regard to phenolsulphonphthalein excretion, revealed that in the former it varied with the age. Before 50, the function is more or less constant but after 50 it diminishes rapidly. The renal function

of myxedema patients is slightly but consistently lower than that of exophthalmic patients except those aged 60 and over. The authors state there is no relation between the degree of excretion in goiter and myxedema and the basal metabolic rate or the degree of anemia. The data thus presented offer no support to the concept that permeability of the renal tissue is significantly altered in hyperthyroidism or myxedema.

Urography.—Ever since retrograde catheterization with pyelographic media has become an asset to the urologist in the diagnosis of diseases of the kidney, pelvis and ureter, attempts have been made to find drugs which would be harmless, nonirritating, and could be administered intravenously, and would be eliminated in sufficient concentration from the urinary tract to give x-ray evidence of normalcy or pathology in the urinary tract.

Binz, a chemist, working in connection with the Clinic of von Lichtenberg, in Berlin, where Swick was a coworker, after many experiments, developed an iodine preparation which was called *uroselectan*. Since then, several other drugs have been placed upon the market which have properties similar to *uroselectan*. The 3 principal drugs are *uroselectan*, *skioldan* and *neo-iopax*. The use of these drugs injected intravenously has not proven to be as universally helpful in diagnostic urography as was at first hoped, however, they have proven to have a large field of usefulness and, as adjuncts to the diagnostic technic, have made it possible for a more thorough study of the urological tract in many conditions.

The *diagnostic value* of *intravenous pyelography* is at present not disputed. While there are many limitations to this procedure, still it has a most useful field.

There are certain cases where it is impossible for various reasons to do retrograde pyelograms. It is in these cases that the intravenous method is so valuable. It is also possible to judge grossly the functional capacity of the kidneys with this procedure. In tuberculosis or suspicious tuberculosis of the kidney, this method may develop as the diagnostic procedure of choice, although the reviewer believes that the dangers of infecting the normal kidney by ureteral catheterization in tuberculosis of the genitourinary tract are much exaggerated. Mgliardi (Radiol med 19 451 1932), in reporting his findings in 26 cases of renal tuberculosis which were studied by intravenous pyelography, is convinced of the helpfulness of this procedure, but feels that it should only be one of the steps in the complete study of any given case.

D. P. Cuthbertson and A. Jacobs (Brit J Urol 4 36 (Mar.) 1932) discuss the value of the measurement of volume output and specific gravity of the urine following the injection of *uroselectan* as a measure of *kidney function*. They show that while the maximum specific gravity coincides generally with the maximum concentration of iodine eliminated, it does not in any way correspond to the maximum hourly excretion of this element as combined in *uroselectan*. The urinary volume appears to offer a safer guide to the rate of elimination of this substance, but the conception of diuresis is a relative matter. Control days, when the same amounts of food and fluid are consumed at precisely the same times, are necessary. Clinically, this is difficult. It is possible that the total iodine content of the first hourly specimen of urine may prove to be a satisfactory test. In a normal case where *uroselectan* has

been given, the normal output during the first hour would appear to be 20 per cent or more of the injected iodine compound. If uroselectan be displaced by other iodine-containing compounds, most information will still be gained from the analysis of the earlier specimens of urine.

A very interesting case is reported by A. O. Wilensky (Urol and Cutan Rev. 36:38 (Jan) 1932), which demonstrates a *source of error* as a result of intravenous pyelography. This patient was studied by the author and a pre-operative diagnosis of tumor in the left kidney was made as a result of the history, observed hematuria, cystoscopic findings, presence of an enlarged left kidney, and the complete absence of function in the left kidney, as shown by the uroselectan test. A good deal of emphasis was placed upon the last factor. At operation no tumor was found. A control observation by uroselectan was made following the operative exploration, and the following report was made: The right kidney was considered normal. The left side in 15 minutes showed a very faint trace of the injected material in the pelvis and ureter. At the succeeding examinations the same occurred and at 3 hours none was seen. Such poor elimination is due to a very marked loss of function of the kidney. The final diagnosis was hemorrhagic nephritis.

A follow-up control pyelo-urogram was done several months later and showed the persistence of the failure in this kidney to excrete the uroselectan. Wilensky concludes that in the absence of any other finding at operation and in the presence of a proved glomerulonephritis in an explored kidney, it seems that the pyelo-urographic evidence must be connected with the

glomerular lesion, most probably on the basis of inequality of lesion in either of the two kidneys.

W. H. Kinney (Pennsylvania M. J. 35:223 (Jan) 1932) discusses at length the necessity for all of the diagnostic aids and a complete urological study in all cases where renal infections are suspected. He considers *pyelography* as one of the most important procedures in the diagnosis of renal infection and goes on to show that *skioldan* and *iopax* are extremely valuable and necessary in certain types of diagnostic procedure. The *contraindications to intravenous urography* are latent uremic conditions, acute nephritis, and various liver complications. In pulmonary tuberculosis, intravenous urography seems to have no deleterious effect. He calls for, as he should, the closest cooperation between the urologist, the roentgenologist, the internist and the laboratory. In discussing this paper, Randall says that he looks forward to an increase in the conservatism of surgery of the renal parenchyma and an understanding of post-operative care which will eradicate infections. He feels that this will come about as a result of the more thorough and increased diagnostic ability at the disposal of the urologist.

Untoward Effects—In discussing the subject of intravenous pyelography, M. B. Wesson (Urol and Cutan Rev. 36:296 (May) 1932) states that the most common complaints when *iopax* or *skioldan* is used are a feeling of warmth and pain in the hand and extending to the shoulders. Occasionally, there may be headaches, slight rise in temperature, nausea, vomiting, dryness of the throat and extreme thirst. There have been occasional symptoms of acute iodism, such as lacrimation, sneezing and dyspnea. All of these symptoms are transi-

tory Wesson says he has had no personal untoward symptoms from neopax excepting the pain in the shoulders

The *contraindications* are advanced renal insufficiency or general weakness. Particularly prone to reactions are cases of idiosyncrasy to iodine, hyperthyrosis, pregnancy, active tuberculosis, thyrotoxicosis, acute and chronic renal disease.

Indications—Retrograde pyelography should always be used in chronic pyelonephritis and in tuberculosis, according to Wesson (*loc cit*), as purulent infection inhibits excretion. If no visualization occurs due to severe kidney damage, retrograde pyelography must be done. *Intravenous pyelography* is indicated when cystoscopy is impossible and when cystoscopy is possible but the ureteral orifice cannot be located because of bleeding, extensive vesical neoplasms, implantation of the ureters in the rectum and when there is a stenosis of the ureter by calculus, stricture or kinking, and when direct pyelography cannot be undertaken without risk. It is valuable for the gynecologist who has cut a ureter and wants to learn whether his repair has held. It is particularly valuable in stasis, being much better than retrograde in hydronephrosis, congenital dilatation of the ureter, ureteral regurgitation, floating kidney and where pictures can be obtained in marked tubular damage.

Occasionally, a good kidney shadow is seen and a poor urogram, this is due to a delay in elimination and is of diagnostic value in ruling out the presence of ureteral stones, which have an inhibitory action on the excretion of the substance. No picture after injection usually means an absent kidney or serious functional impairment, advanced

tumors, pyonephrosis, seriously infected obstructed kidneys and severe cardiac insufficiency.

Intravenous pyelography is particularly valuable in cases of renal lithiasis. Very often it is necessary to check with both intravenous and retrograde pyelography. Diagnosis by intravenous urography is available to the general profession but the warning is emphasized that the interpretation of the urogram is extremely difficult and should be referred to one who has had extensive experience, and this means a roentgenologist who has had special training in urological diagnosis.

Pyeloscopy.—Manges was first to observe and study the urinary tract fluoroscopically in 1912. Legueu attempted to popularize this method. Braasch recognized the value of pyeloscopy in the recognition of early neoplasms and the competency of the muscular function of the renal pelvis in hydronephrosis. Hyrntschak, Jarro, Cumming and others, have studied the urinary tract by this method.

Herbst's technic (Urol and Cutan. Rev 36 568 (Sept) 1932) is as follows:

If the patient is suspected of having some pain-producing abnormal motility syndrome, he must not have any preliminary medication because of the effect of drugs. Number 5 or 6 x-ray catheters are passed to either or both kidneys. It is necessary to have adequate eye accommodation. When the accommodation is complete, the catheters are visualized and any excursion as a result of the upright and prone positions is noted. The result of manual abdominal pressure on the position of the kidneys is noted. In the prone position, 30 per cent sodium iodide is injected until the renal pelvis is satisfactorily outlined. If the catheter is too high, it can be changed to its proper position just above the ureteropelvic junction. If it is not high enough, the pelvis can be filled with a forceful fluoroscopically-controlled injection, or the catheter

may be pushed higher up. *The observation of the filling is important.* If difficulty is experienced in filling any calyx, it should be noted. After filling, the contraction of the calyces, pelvis, and ureter is observed, both in the prone and upright positions.

Indication—This method is very valuable in determining ptosis, whether the neuromuscular mechanism of the pelvis is dynamic or nondynamic.

In ureteral conditions this technic is particularly adaptable. Legueu and his coworkers have stated that interference with motility in a calyx is pathognomonic in cases of renal neoplasms. Pyeloscopy is particularly valuable in nephroptosis with pain.

ANOMALIES.—F Luque (Urol and Cutan Rev 36 373 (June) 1932) recites a case of anomaly in which there were *bilateral double ureters* and *double pelvises*, all 4 anatomically and functionally entirely independent.

J A H Magoun (J Urol 27 435 (Apr) 1932) divides renal anomalies into 8 groups:

- 1 Cases with unilateral reduplication of the renal pelvis and ureter, without clinical evidence of pathology either within or out of the kidney
- 2 Cases with unilateral reduplication of the renal pelvis, with partial or complete reduplication of the ureter, accompanied by extrarenal pathology
- 3 Same as Groups 1 and 2, with pathology of the urinary system
- 4 Cases with bilateral complete reduplication of the pelvis and ureter
- 5 Cases with horseshoe kidney
- 6 Cases with ectopic kidney
- 7 Cases with hypoplastic kidney
8. Cases with faulty rotation of the kidney

He then cites cases to justify the diagnosis in these particular groups and believes that the anomalous kidney is much more subject to pathological changes. In his experience he has observed that following plastic operations on the renal pelvis, the anatomic condi-

tion is unimproved but a symptomatic cure is obtained. An *ectopic kidney*, if the fellow is normal, is best treated by radical surgery. He warns against the removal of a large hydronephrotic kidney when there is a possibility of an opposite hypoplastic kidney, because life may be sustained by the huge hydronephrotic kidney.

Congenital solitary kidney is a rare condition. About 26 cases have been reported in the literature. In several cases a congenital solitary kidney was removed upon the assumption of a healthy organ on the opposite side. This accident, however, should never occur with modern diagnostic methods. T D Moore (*Ibid* 27 581 (May) 1932) reports a personal case of *hydronephrosis* in a congenital solitary kidney in which conservative treatment was used. The kidney was operated upon with the ureter emerging high on the anterolateral aspect of the pelvis. Prior to operation, a No 12 F catheter was inserted and left *in situ*. The ureter was then present in the lowest portion of the pelvis and a lateral anastomosis was made between the ureter and kidney pelvis. The ureter was stitched to the pelvis as far as its most dependent portion and a lateral anastomosis made. The indwelling catheter was not removed and drainage was provided down to the point of anastomosis. Six weeks following operation, the patient was well and, 3 months later, an intravenous pyelogram showed that the hydronephrosis had diminished about 50 per cent.

McNally (*Ibid* 28 289 (Sept) 1932) discusses *unilateral renal agenesis* or complete absence of the kidney on the affected side. He collected 19 previous cases in the literature and reports one of his own. In 15 of these cases the kidney was absent on the left side.

The ureteral orifice and the corresponding ureter are absent in the majority of cases. The diagnosis is made by cystoscopy and urography. The importance of this condition, of course, is paramount where any operative procedure is contemplated on the single, good kidney, and constitutes, as has heretofore been said, the indications for the most conservative treatment of the sole functioning kidney.

Horseshoe Kidney.—Diagnosis — J. S. Ritter and L. A. Shifrin (Urol. and Cutan. Rev. 36:311 (May) 1932) describe a case in which they make a diagnosis of *renal calculus* in horseshoe kidney. They claim that by intravenous urography it is easier to make a diagnosis of horseshoe kidney than by retrograde catheterization, but this is, of course, debatable. In their case they did a simple pyelotomy, removing the stone, with excellent results. Attention is called to the fact that the pyelotomy must be done anteriorly.

H. S. Jeck (J. A. M. A. 98:603 (Feb. 20) 1932) reports a series of cases in which he emphasizes the statements already made that surgical diseases are more liable to occur in horseshoe kidney than in the normal kidney because of the poor pelvic drainage. He emphasizes cystoscopy and intravenous urography in the diagnosis of the condition. He likewise insists upon the most conservative type of surgery, with the operations very carefully planned. Attention is called to the factors which make these precautionary measures necessary: (a) the anomalous blood supply, (b) the possible presence of the two ureters on the same side; (c) the size and character of the isthmus; (d) the relative immobility of the kidney, and (e) the possibility of the presence of the rarer anomalies, such as

fusion of the suprarenals. In performing heminephrectomy for pathological conditions, he insists upon an extra-peritoneal exposure, preferably, which allows the careful visualization of the kidney pelvis, isthmus and accessory vessels.

Treatment — In the treatment of some cases of horseshoe kidneys, heminephrectomy is indicated as, for instance, in the adenocarcinoma reported by Elmer Hess (J. Urol. 27:47 (Jan) 1932).

After discussing the symptoms and diagnosis of horseshoe kidney, J. A. Lazarus (*Ibid.* 27:471 (Apr.) 1932) describes the treatment and results. He also emphasizes that heminephrectomy is the operation of choice in cases of tumor, pyonephrosis and tuberculosis involving one-half of a horseshoe kidney. Bottez collected 8 cases of tuberculosis in horseshoe kidney with 3 reported cures. The author has obtained a cure of tuberculosis by heminephrectomy in a tuberculous kidney. It is perfectly possible to do a heminephrectomy through the usual loin incision. He reports several cases in his own practice and draws the conclusions that this is not as rare an anomaly as heretofore thought and that these kidneys are very prone to pathological changes. There are no symptoms characteristic of horseshoe kidney *per se*. He considers the proper interpretation of pyelograms and advocates heminephrectomy.

The treatment of a horseshoe kidney, according to Gutierrez (*loc. cit.*), may be divided into the medical, urological and surgical. Medical treatment is indicated in those cases with acute infection, where the usual treatment of renal infections is indicated. Urologic treatment consists of pelvic lavage and

the use of indwelling ureteral catheters. Surgical treatment comprises the removal of any pathologic factors which may be present such as calculi, the drainage of infections or heminephrectomy. For cases in which the symptoms persist after the infection has been cleared and pathologic changes have been completely removed, the author advocates renal symphysiotomy.

CARBUNCLE.—Symptoms—Carbuncle of the kidney is a well-established clinical entity, the principal symptoms being the absence of urinary findings with high fever, one-sided renal pain with an established area, usually in the skin, of focal infection and costovertebral tenderness on the affected side. The condition has not often been recognized in children

Diagnosis.—According to L. Brady (*Ibid* 27 295 (Mar) 1932), the early diagnosis of carbuncle of the kidney can frequently be made in the case of a patient who is known to have recently had a boil, carbuncle or other staphylococcal infection, who was complaining of pain in one flank, was extremely ill with a high septic temperature, and who on examination, showed definite tenderness under one costal margin but whose urine contains little or no pus

Renal carbuncle, or localized massive suppuration within the kidney, apparently is not a common infection during infancy. M. F. Campbell (*J A M A* 98 1729 (May 14) 1932), who reports 2 cases, each in an infant, 8 weeks of age, could find no other reported cases in infants. The clinical picture is essentially the same as in adults. The diagnosis of renal carbuncle is difficult at best, and in many instances the renal involvement is discovered during operation for perinephritic abscess. The author stresses the value of kidney ob-

servation during such an operation. He also states that continued fever and toxemia following liberal incision of a perirenal abscess should indicate a thorough renal exploration. The demonstration of these 2 cases, according to Campbell, is a specific example of "an insufficiently recognized principle of medical practice, namely, that infants and children are subject to practically every form of urologic disease which one is accustomed to associate with adult life, and, when clinical manifestations indicate a thorough urologic examination or radical urosurgical treatment, extreme youth is no contraindication."

Treatment.—Brady (*loc cit*) believes that the upper poles are the sites of predilection, and that a nephrectomy should not be performed excepting under one or two conditions: (a) if the general infection is so overwhelming that it is absolutely imperative to remove as much of the infected tissue as possible, nephrectomy; or, (b) if a patient has good renal function in the uninvolved kidney and is in poor general condition, either through advanced age or other pathological conditions, it is wise to remove the involved kidney to shorten convalescence. Brady's patient was operated upon and drains were placed down to the carbuncle after the true capsule of the kidney had been freed. He suggests the possibility of a staphylococcal bacteriophage in the treatment.

D. J. MacMyn (*Brit J Urol* 4 11 (Mar.) 1932) emphasizes nephrectomy as the safest treatment in carbuncle of the kidney and describes 2 personal cases in which this operation was done, one case recovering while the other died. In the latter case there was no preceding history of a cutaneous infection.

HYDRONEPHROSIS.—*Etiology.*—The etiology of hydronephrosis may be divided into 2 groups, according to J P Hosford (Lancet 1 435 (Feb 27) 1932), *ie*, the *congenital* and the *acquired* forms. To the author, the word “congenital” means only those cases found at birth or discovered soon thereafter, and these may be subdivided into 2 groups.

1 Those with obstruction due to a lesion such as a stricture, narrowing, or a fold

2 Those of megaloureter and hydronephrosis, in which no type of mechanical obstruction is demonstrable. In such cases deficient development of the musculature of the ureter may be responsible for the condition

Cases of acquired hydronephrosis are also subdivided into 2 groups

1 Cases with a demonstrable macroscopic obstruction from a calculus, neoplasm, tuberculous inflammation in the ureter, a ureteral stricture or a ureteral kink caused by aberrant vessels or abnormal mobility of the kidney. Where there is a sudden complete obstruction, there is not time enough for the development of a primary atrophy and although a hydronephrotic sac does develop, it is not to the extent or degree seen in incomplete or partial obstruction

2. Cases with functional obstruction. Peristalsis begins in the major calyces near the tips of the papillae and passes downward over the pelvis and the ureter, with definite slowing at the pelvi-ureteral junction

Hydronephrosis may be divided into: (1) the renal, (2) the pelvirenal, and (3) the pelvic type. The first is usually due to a calculus; the second to a definite obstruction below the uretero-pelvic junction, and the cause of the third is obscure

Pathogenesis.—In a discussion of the pathogenesis of hydronephrosis, P Buisson (Radiol med 19 369 (Apr) 1932) states that the most important factor is mechanical obstruction to the urinary flow from either a congenital or acquired cause. In no cases could a spastic obstruction be considered responsible

C M. Johnson (J Urol. 27:279 (Mar) 1932) studied the pathogenesis of hydronephrosis. He attempted the dissection of the renal tubules and found that dilatation begins at the glomerulus and proceeds quickly to the papillary ducts within 2 or 3 weeks. Atrophy of the glomerulus develops within 1 month also of the proximal convoluted tubules, with some dilatation still present in the distal convoluted tubules and collecting tubules. Progressive atrophy of the glomeruli and convoluted tubules occurs with dilatation of the collecting tubules of the medulla. By the end of 3 months some glomeruli are directly in communication with the collecting tubules, as a result of shortening, straightening and finally disappearance of the convoluted tubules. Maximum dilatation of the remaining collecting tubules in the medulla is reached in five months. Gradual atrophy and shrinkage in all dimensions then takes place

Diagnosis.—From a diagnostic standpoint, P Buisson (*loc cit.*) believes *pyelography* permits recognition of a case of hydronephrosis in all its stages, allows a differentiation from other renal lesions and anomalies, frequently establishes the pathogenesis, and makes possible the choice of the best therapeutic procedure

The author believes the absence of a renal shadow is a sign of renal insufficiency and due to a decrease in the blood supply of the parenchyma. A distinct

shadow to him is usually indicative of a good renal function

Treatment.—J K Ormond (J Michigan M Soc 31 18 (Jan) 1932) believes that in selected cases of hydronephrosis, plastic operations on the ureteropelvic junction are indicated. A pyelogram of the supposedly uninvolved kidney is advised in every case. The factors which help him decide upon plastic surgery or a nephrectomy are (1) the condition of the opposite kidney, (2) the functioning power of the affected kidney and the cause of the hydronephrosis, (3) the age of the patient, and (4) his financial status. Following a plastic operation, the author believes all patients should have the benefit of ureteral dilatation and pelvic lavage.

PERINEPHRITIC ABSCESS.—

Etiology.—This disorder is usually secondary to infection elsewhere in the body. The usual organism is the *staphylococcus*. The abscess may come from a cortical abscess in the kidney or it may be the type which develops in the advanced stages of pyonephrosis, hydronephrosis, lithiasis and severe injury to the kidney. Occasionally it occurs following infections in the lungs and pelvic and abdominal organs, such as cases of appendiceal abscess. Floyd and Pittman (Urol and Cutan Rev 36 439 (July) 1932) report such a case.

There are many cases of *staphylococcal infections* of the kidney which do not go on to carbuncle or perinephritic abscess formation. These cases are relatively common and are always hematogenous in origin. Usually a focus of infection can be isolated. These cases are extremely ill with a great deal of costovertebral pain and tenderness, but most of them end in complete recovery. Surgery should be reserved for those

that develop carbuncle or perinephritic accumulations of pus. This case was reported by R M Nesbit (J A M A 98 709 (Feb 27) 1932).

Symptoms.—The work of A Vogl (Deutsche med Wchnschr 58 1122 (July 15) 1932) reveals that the symptoms of perinephric abscess are few but characteristic. The main one is the deep painfulness in the renal region, detected by a short firm blow upon the lumbar musculature. A negative urine is usually accompanied by a high fever and leukocytosis. According to the author, spontaneous recovery is very rare and should therefore not be relied upon.

Diagnosis.—H A Fowler and H N Dorman (J Urol 26 705 (Dec) 1931) believe the suppurative inflammation of the fatty tissues surrounding the kidney is uncommon as compared to surgical conditions arising within the kidney. Perinephric abscesses are classified as: (1) those secondary to grave destruction of the kidney, and (2) those which may be considered of metastatic origin. In the 11 cases reviewed by the authors the diagnosis was based on the history of peripheral infection, unexplained fever, a high leukocytosis, the x-ray findings, and costovertebral pain and tenderness.

RENAL HEMORRHAGE.—

Other unusual conditions are found in renal work. Muschat (J Urol 28 157 (Aug) 1932) reports 3 cases of massive renal hemorrhage in which it was impossible to make a diagnosis prior to operation but in which nephrectomy was necessary to save the patient's life. These kidneys were very carefully studied following removal and the pathological findings consisted in a destruction of the tubular lining of the straight collecting tubules in the papillae, with regenerative hyperplasia of the lining of the collecting tubules in the papillae.

and the formation of varicosities at the tip of the papillæ. It is believed that, due to the pressure of these thin-walled varices, there was rupture with accompanying hemorrhage.

PTOSIS.—Renal ptosis will, in the opinion of the reviewer, always be a subject of great controversy from the standpoint of treatment. It is the opinion of the vast majority of men that renal ptosis *per se* is not necessarily a producer of systemic discomfort to the patient, and the vast majority of observers are of the opinion that obstruction with or without infection must supervene before the ptosis demands treatment.

This subject is very thoroughly discussed by W F Braasch (J A M A 98 613 (Feb 20) 1932). An obstruction as a result of ptosis can always be demonstrated, either by intravenous pyelography or retrograde urological examination. It has been his experience that with nephropexy without previous evidence of urinary stasis, the symptoms will return after a few years. In an editorial (Surg Gynec and Obst 55 247 (Aug) 1932) Braasch again makes the statement "It must be admitted that nephropexy in cases in which there is no evidence of renal stasis may be followed in some instances by relief of symptoms for a variable period." He has concluded that very few patients are relieved by renal fixation.

Differential Diagnosis.—Usually, infection of the pelvis of the ptotic kidney causes the symptoms which bring the patient to the urologist. F S Mainzer (Pennsylvania M J 35 462 (Apr) 1932) reports an interesting case of chronic pyelitis in a ptotic kidney which so simulated *tuberculosis* in its urological findings that it required extremely careful study to rule out this diagnosis.

TUBERCULOSIS.—The results of a survey of 56 cases of renal tuberculosis seen during the past 2 years are summarized by H H Shih and G Y Char (Chinese M J 46 285 (Mar) 1932). It was found 3 times as frequent in the male as in the female and occurred more frequently in the second, third and fourth decades of life. Either kidney was affected with equal frequency and the evidence of tuberculosis in some other part of the body was found in 35 per cent of the cases. Sixty per cent were observed within the first year of symptoms. They were in the order of their frequency. (1) hematuria, (2) frequency of urination, (3) painful urination, (4) pyuria, (5) renal and vesical pain. Tubercle bacilli were recovered in 27 per cent, in catheterized specimens from separate ureters in 36 per cent and by guinea-pig inoculation only in 9 per cent, a total of 72 per cent. The author believes firmly that renal tuberculosis is never cured by general medical and hygienic measures alone. **Nephrectomy**, wherever possible, is the treatment of choice.

Pathology.—The literature on *pyeloureteral tuberculosis* is extensively reviewed by R Dossot (Arch méd de la clin de Necker 6 137 (1931)). He considers the disease in the pelvis and ureter rare unless there is parenchymal involvement. The original lesion is usually at the site of insertion of the calyces around the papillæ, and from this point extends upward to the kidney substance and downward to the pelvis and ureter. Dossot is a strong advocate of *pyeloscopic examination* for disturbances of motility. If the lesion is at all well advanced, there is peripyelitis and periureteritis and, unless properly treated, the disease is generally progressive and

may result in stricture and obliteration of the ureter, renal caseation may also take place and autonephrectomy. The pathological changes are classified as those in which the renal lesions are still limited, those in which they are generalized, those which show excluded areas, and those which may be considered terminal. He emphasizes the functional disturbance characterized by sluggishness in contraction and slight retardation of evacuation with subsequent dilatation of the renal pelvis. With the progress of the anatomical lesions, the functional disturbance increases and the extension to the other organs in the genitourinary tract is progressive. He warns against the erroneous interpretation of a reflux to the opposite side.

The significance of tubercle bacilli in the urine is discussed by E. M. Medlar (*Urol and Cutan Rev* 36 71 (Feb) 1932), who states that the essential pathology of a tuberculous lesion in the kidney differs in no respect from one in any other tissue. The pathogenesis of a microscopical tubercle differs from a lesion which has destroyed a whole kidney only in size of the lesion and the amount of tissue involved. Consequently, if the process in a microscopical tubercle is understood, the pathology which a so-called surgical tuberculous kidney presents becomes greatly simplified. It is Medlar's belief that those physicians render the greatest service to their patients who have a thorough working knowledge of the pathology underlying the condition that needs medical supervision.

Diagnosis.—Tuberculosis of the kidney at times is one of the most difficult diagnoses to make; at other times it is comparatively easy. C. M. McKenna and H. C. Sweany (*Surg Gynec and*

Obst 54 239 (Feb) 1932) are impressed with the difficulty sometimes encountered in arriving at an absolute clinical diagnosis and a complete diagnosis from either surgical or postmortem material. They believe there is need for a correlated study of clinical, pathological and bacteriological findings in genitourinary tuberculosis. The general opinion among urologists is that the disease is most commonly hematogenous, involving 1 kidney first or 1 epididymis and from these points spreading to other parts of the tract. In pulmonary tuberculosis, Hueber states that 3 to 5 per cent reveal genitourinary lesions, while 50 to 70 per cent of extrapulmonary tuberculosis have urogenital lesions. They discuss the study of urogenital tuberculosis in detail. Few operable kidney lesions were found in a series of patients dying of pulmonary tuberculosis. They believe that the operable cases are more likely to be found in patients with extrapulmonary lesions or with minor foci in the lungs. Primary tuberculosis in other cases occurred in 4.2 per cent. They believe that this is more common than ordinarily reported.

Treatment.—A. I. Folsom (*Urol and Cutan. Rev* 36 75 (Feb) 1932) states that he believes that a definite, clinically clear-cut case of unilateral renal tuberculosis should be operated upon immediately and that he would be giving, in those circumstances, the body and its one remaining sound kidney their best chance. He advocates the immediate removal of the involved kidney as the only rational procedure when once a diagnosis of renal tuberculosis has been made.

In the treatment of tuberculosis of the kidney, La Pena (*J. Urol.* 28 343 (Sept) 1932) suggests a new and

rather startling procedure in which, by **electrocoagulation**, he occludes the ureter from the infected kidney until the development of compensatory hyperplasia in the remaining kidney. He feels that this diminishes the risk of nephrectomy when later attempted and helps to prevent infection of the genital organs and the infection of the other kidney in the event of bladder reflux. He warns against the danger of a sudden hydronephrosis or pyonephrosis or peritonitis if faulty technic is used.

TUMORS—Pathogenesis.—L. W. Smith and H. W. Ferris (Am J Surg 13:552 (Sept.) 1931) are of the impression that all tumors of the kidney have a common origin in a perinephric rest and that the differences are inherently due to a particular reaction of the individual rather than any fundamental difference in the cells of origin. The authors believe that *tumors of the adrenal* are usually slow-growing but may metastasize by the blood stream very rapidly. They represent, perhaps, slightly more differentiated epithelium than do the tumors of renal origin, but their fundamental cell prototypes are essentially the same. In reviewing the embryonal tumors of infancy and childhood, the current theory of renal blastoma origin has been accepted by the authors. It is thus but a step from this point to the next one of recognition of the adult hypernephroma as arising merely from a later stage of differentiation of the renal blastoma.

Pathology.—A *fetal renal tumor* is described by G. W. Nicholson (J Path and Bact 34:711 (Nov.) 1931) in which the structure of the developing organ was retained to an unusual extent. Section of the neoplasm revealed tubules of 2 types and glomeruli in all stages of development. The latter were true

glomeruli and quite distinct from tubules of various kind- and shapes more or less invaginated by areolar tissue or cellular parenchyma, the pseudoglomeruli. The capsule consisted of a thin layer of fibrous tissue with many atrophic glomeruli, and represented the compressed renal cortex.

Diagnosis.—To have a renal tumor with fever as its only symptom is rather unusual. Israel (1911) pointed out that a rise in temperature may be a symptom of renal tumor. Ordinarily, this is not an important diagnostic point. As a result of the many negative examinations which the patient had had in an endeavor to ascertain the cause of her temperature, she was finally cystoscoped and intravenous pyelography was also done. This revealed a lobulated tumor in the middle portion of the left kidney. Nephrectomy was carried out immediately. The author felt that the fever was purely due to the absorption of toxic products of necrosis in the tumorous tissue. This particular case shows the value of intravenous urography and x-rays in the study of obscure elevations of temperature. This case was reported by Ljunggren (Brit. J Urol 4:249 (Sept.) 1932).

Prognosis.—The prognosis in renal tumors, regardless of their origin, is not particularly good unless nephrectomy is done early in the disease. V. C. Hunt (Urol and Cutan Rev 36:291 (May) 1932) considers nephrectomy the only rational procedure and makes the statement, backed by his own experience and a review of the literature, that there is a high percentage of cures following nephrectomy when instituted early and while the disease is confined within the kidney. He discusses those tumors originating in the pelvis and those in the kidney proper, attempts to classify them,

and states that 90 per cent of renal neoplasms are cortical in origin. In reviewing 367 cases from The Mayo Clinic, it was decided that the incidence of *metastases* is extremely high at the time diagnosis is made and nephrectomy performed. He emphasizes the point that malignant renal disease is more frequent in the male than in the female, and insists upon complete urological survey at once following a hematuria.

Adenocarcinoma.—A case of *adenocarcinoma of a horseshoe kidney* is reviewed by Elmer Hess (J Urol 27 47 (Jan) 1932) in which diagnosis was made, both of the tumor and of the horseshoe kidney, preoperatively, and a successful heminephrectomy was accomplished with what at first appeared to be brilliant results. However, a year later, *metastases* had taken place to the right ileum, and 2 years later, though not reported in this article, the patient died of general metastases. This case bears out the point previously made, that by the time the diagnosis is possible, metastasis has unquestionably already taken place. This case shows the feasibility of heminephrectomy for this condition in horseshoe kidneys.

Papillary adenocarcinoma and the *papillary epithelioma* of the kidney pelvis are discussed by Wesson (Urol and Cutan. Rev 36 627 (Sept) 1932). He stresses the difference in the pyelograms between the pelvic and the parenchymal tumors and believes that trauma has no relationship to their development.

Carcinoma.—*Pathogenesis* — B. L. Crawford (Pennsylvania M J 35 629 (June) 1932) discusses the origin of *cortical* renal tumors and whether carcinomas occur from adrenal rests or whether these tumors arise from renal epithelium. Some authors doubt the adrenal rest theory. Ewing is of the

opinion that certain tumors arise from these rests, but the majority of the so-called hypernephromas are adenocarcinomas. Again, the author emphasizes that tumors of the kidney, as a rule, have attained a large size before they are recognized and that metastasis has already occurred. He again insists upon the immediate examination of all patients with hematuria.

Prognosis—J. R. Hand and A. C. Broders (J Urol 28 199 (Aug) 1932) have studied 193 cases of carcinoma of the renal *cortex*. They have done this to determine the degree of malignancy and its bearing upon the prognosis. The grade of malignancy was found higher in patients under 40. In those in which the grade of malignancy was 2, 3 and 4 the average duration of life following operation was twice as long as the period over which symptoms existed, while in those of grade 1, the average duration after operation was 3 times as long as the period of symptoms. Over half of the patients in this series died within 2 years, postoperatively. Involvement of the renal veins is a serious complication and increases operative risk. Twenty-three of the patients in the series are living. Of the 193 patients who underwent nephrectomy, 44 are living. The vast majority of these had carcinomas of the lower grades. This study bears out the experience of the clinical urologists who deal with the bladder tumors.

Hemangioma.—D. W. MacKenzie and A. B. Hawthorne (J Urol 26 205 (Aug) 1931) observed 2 cases of hemangioma of the kidney in males in which hematuria and pain in the loin were present. In one, the growth was at the upper pole of the kidney and in the second, near the central portion of the organ.

Oertel is quoted as believing that these growths develop by a budding of the endothelial cells from an originally normal focus or from an embryonic faulty overproduction of blood-vessels in a part. Many of the cases have been incorrectly diagnosed essential hematuria, especially those with no great deformity of the pyelogram. They are usually single unilateral lesions in the pelvis or medulla, and nephrectomy is the only satisfactory treatment.

Leiomyoma.—*Malignant leiomyomas* of the kidney or smooth muscle tumors are rare. A. H. Crosbie and H. Pinkerton (*Ibid* 27.27 (Jan) 1932) report a case in which the diagnosis of malignancy in the kidney was made from the pyelogram, and reviews the literature in which there have only been 4 cases of this character heretofore reported. These tumors are not supposed to be particularly malignant, although they are so rapidly growing, with typical cells and mitotic figures, that they must be considered potentially malignant.

Sarcoma.—This is of great rarity and of high malignancy. L. Herman and L. B. Greene (*Ibid* 27 317 (Mar) 1932) report 2 cases, one of which was operated upon and died a month later; the other one was diagnosed and not operated upon, but died promptly. A partial autopsy confirmed the diagnosis of sarcoma with metastases to the retroperitoneal tissues.

Diagnosis.—While the subject of rare renal tumors is being discussed, renal and peritoneal sarcomata are reported by L. C. Jacobs and L. H. Hoffman (*Ibid* 27 33 (Jan) 1932). Both of their cases were connective tissue tumors, perinephritic in origin. Both cases died of recurrence and metastases. They are extremely difficult to *diagnose* preoperatively. The chief complaint in

these tumors is pain, persistent and growing worse because of the continued pressure of neoplasm upon the lumbosacral nerves. In both of the cases reported, fever was present and the authors believe that in true connective tissue types of perirenal tumors, fever is present and is due to the absorption of toxins. Hematuria is not often found in these cases. They advise the complete removal of fatty tissue with deep x-ray therapy at the site of the nephrectomatized area, but with a very grave prognosis.

RENAL SURGERY.—**Heminephrectomy.**—Wright (*Urol and Cutan Rev.* 36 592 (Sept) 1932), Stone (*J. Urol* 28 301 (Sept) 1932), and Hess (*Ibid* 27 47 (Jan) 1932) have all reported interesting cases of heminephrectomy, either in horseshoe kidneys or in pathological conditions affecting limited portions of the kidney. The *indications* for heminephrectomy are pain due to dilated pelvis with or without infection; in duplication of the renal pelvis with 2 ureters; pyonephrosis where the infection is limited to the upper or lower segment of the kidney; hydronephrosis, pyelonephritis; calculus; tuberculosis, incontinence where, in duplication of the ureter, the opening from the upper pole is in the urethra or vagina; stricture of the urethra; kinked ureter; ureteral calculus; obliterated ureter, and horseshoe kidney with any of the above pathological conditions confined to one-half of the organ.

The *technic* of the operation is essentially the same as done by all modern operators. It consists first of ligating the blood supply to the segment to be removed; second, if there is a double ureter, ligation of the ureter to the segment to be removed, and third, the removal of a wedge-shaped piece shown by the line of demarcation caused by the shutting off of the blood supply. Double sutures

are placed through the wedge and tied over fat or muscle, to prevent the sutures from tearing through the renal parenchyma. Some operators take a piece of muscle and place it between the cut edges of the kidney surface, feeling that in this way they get better hemostasis. This procedure is not necessary if the artery supplying the segment to be removed is ligated prior to the incision to be made into the kidney. Stone suspends the remaining segment, other operators do not. Stone and Wright suspend the kidney. [Personally, I do not believe this is essential, as in 3 cases of heminephrectomy no attempt has been made to carry out this last procedure.—Ed.]

The *end-results* in 13 cases where the renal pelvis has been resected and other plastic operations have been done for hydronephrosis are reported by W. Walters (Surg Gynec and Obst 55:508 (Oct) 1932). He divides the bands which cause angulation and collapse of the ureter, with or without nephrostomy. Other cases require the division of anomalous blood-vessels. In several cases he has had to reimplant the ureter into the renal pelvis, while in others he has done a ureteropyeloneostomy. Bilateral resection of the renal pelvis has also been carried out with excellent results. In his work upon hydronephrosis there have been 3 postoperative complications: (1) obstruction at the ureteropelvic juncture, with retention of urine in the renal pelvis; (2) infection of the renal parenchyma, with formation of cortical abscess; and (3) extravasation of urine about the kidney.

In summarizing his work, Walters considers that the procedures done have been satisfactory when measured by the following effects: (1) disappearance of symptoms of obstruction, such as pain and fever; (2) return of the size of the renal pelvis and calyces to within normal limits; (3) absence of retention of urine in the kidney, and (4) im-

provement in renal function as determined by cystoscopic, pyelographic, and intravenous urographic studies made at various intervals subsequent to operation.

Nephrectomy—A. J. Scholl (West J Surg 40:279 (June) 1932) believes that in the majority of cases, even when the ureter is extremely dilated, it is not necessary to remove it when doing a nephrectomy. In cases in which the ureter and any retained contents are infected and obstruction to the lower ureter occurs, this obstruction must be relieved. If it is impossible to relieve this obstruction by conservative methods, a primary nephroureterectomy or a secondary ureterectomy should be performed.

A review of the literature and a report of 3 cases of immediate functional compensation in the remaining kidney following nephrectomy were made by P. Buzen and N. Constantinescu (J d'urolog 33:19, 1932), the following conclusions are quoted:

1. The normal kidney is able to assume the functional capacity of both kidneys within less than 24 hours after nephrectomy because of its reserve functional capacity.

2. Nephrectomy produces a disturbance in the elimination of inorganic salts and other blood substances upon which the integrity of the alimentary tract depends. Twenty-four hours after nephrectomy the urea is eliminated in the maximum concentration. The elimination equilibrium is established within 5 to 7 hours.

3. After nephrectomy, the phenolsulphonphthalein test is of great value in demonstrating the functional capacity of the remaining kidney.

Nephrostomy.—Nephrostomy as an operation is drawing more attention to-

day than ever. In certain types of renal infection, nephrostomy is clearly indicated and is being used more and more by the conservative renal surgeons. The French school, led by Papin, and the German school, under leadership of von Lichtenberg, treat many renal infections by nephrostomy with or without decapsulation. Cabot reports a group of cases in which nephrostomy has been performed. These include nephrolithiasis, hydronephrosis, lesions of the nerves, obstruction of the lower ureter, renal infections, and carcinoma of the bladder. Mortality is comparatively low in his hands. Bleeding is slight. The technic of the operation is very similar to that used on the Continent, consisting mainly of a pyelotomy incision, with the catheter drawn through the parenchyma of the kidney, the eye of which is in the pelvis (Cabot and Holland. Surg Gynec and Obst 54 817 (May) 1932).

Sympathectomy.—The surgery of the sympathetic nervous system and its relationship to renal disease has been of great interest for a long time.

From a series of experimental investigations on the effect of renal denervation on the secretory pressure of the urine, J. M. McCaughan (J Urol 27.659 (June) 1932) concludes that

this secretion pressure was not significantly increased following renal denervation, while Caldwell (*Ibid* 28.323 (Sept) 1932), in conducting another series of experiments in which nephritis was caused by the injection of uranium nitrate in an experimental animal, found that denervation of the kidneys had no effect on the time or amount of diuresis and the loss of edema.

It is interesting to note that V. Lozzi (Policlinico (sez chir) 39 84 (Feb) 1932) observed that the end results of decapsulation and denervation were approximately the same. He considers that decapsulation causes no immediate or delayed injury of renal function. In *reflux anuria* renal decapsulation promptly reestablishes diuresis. In *hematuric chronic nephritis* with pain, renal decapsulation is the method of choice. In *perinephritis* with adhesions and pain, renal decapsulation results in immediate and definite relief.

M. S. S. Earlam and R. K. L. Brown (Australian and New Zealand J. Surg 1 266 (Dec) 1931) believe that localized renal pain arises as a result of stimulation by increased renal tension of the afferent nerves of the pelvis and capsule. Decapsulation, therefore, is temporary and denervation is the essential procedure.

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LACRIMAL APPARATUS.—OBSTRUCTION OF DUCT.—It is pointed out by V. P. Blair, J. B. Brown and W. G. Hamm (Am J Ophth 15.498 (June) 1932) that in the region of the inner canthus correction of deformities is difficult, due to the presence of the canthus and of the lacrimal drainage system. The canthus is subject to dis-

placement, distortion and interference with lacrimal drainage. They describe many ingenious methods used to correct outward, downward and backward displacement as well as distortion of the canthus. They have found that the removal of the lacrimal sac is the most expeditious procedure in every case of chronic complete obstruction of the

lacrimal duct, particularly in those cases in which probing or irrigating does not relieve the symptoms

SECRETION.—E T Collins (Brit J Ophth 16 1 (Jan) 1932) points out that infants under several weeks of age do not shed tears when they cry. The lacrimal glands, however, are well developed and secrete tears in response to irritation. An enzyme called lysozyme which possesses bactericidal action is found in the lacrimal fluid. It seems that silver nitrate used in Credé's treatment for the eyes of the newborn merely acts as an irritant to promote the action of this antibacterial lysozyme.

TUMOR.—A case of *adenocarcinoma* of the lacrimal gland is reported by R H Freyberg (Am J Ophth 15.417 (May) 1932), which was known to have been present 25 years before the death of the patient. The proptosed eyeball had been removed 9 years after the clinical onset of the condition. A slowly growing orbital tumor mass had increased in size for 7 years. An exenteration of the right orbit and involved nasal sinuses had been done 16 years after the original onset. Recurrence followed and exenteration was repeated. Meningitis developed from which the patient died. The neoplastic tumor was diagnosed as an adenocarcinoma. Because of the protracted history of the case, Freyberg suggests that the adenocarcinoma may have been of the mixed type.

LARYNX.—STENOSIS OF LARYNX was discussed by M F Arbuckle (Am Laryng A 54th Ann Congress (May) 1932), who spoke of the added benefits derived from treatment with surgical diathermy following skin grafting. Chevalier Jackson divided these into 2 groups, *ie*, adults

where the larynx is fully developed, and children where air must be kept passing through in order to aid the development of the laryngeal structure, in which case the lumen will be increased in relation to growth of the individual.

ACUTE PERICHONDritis OF LARYNGEAL CARTILAGE.—O Mayer (Wien klin Wchnschr 45.233 (Feb 19) 1932) made interesting observations of this complication of general infections, such as grippe and typhoid fever. They have always been treated as surface abscesses within the larynx by laryngofissure and primary closure which later had to be reopened for further treatment. Mayer calls attention to the early irregular surface or deeper ossification of the cricoid cartilage particularly. Acute perichondritis begins most often here as a metastatic osteomyelitis, involving the bone-marrow, so that where spongy bone lies deep and covered by cartilage, as is often the case, the localization is certainly not in the surface cartilage but in the bony marrow substance wherever it may be and *vice versa*. Treatment, therefore, should not be radical excision of large pieces of cartilage, but rather, as with long bones, drainage of marrow cavity and removal of sequestræ when ready to be discharged, as in the management of any osteomyelitic disease. Since the lamina of the cricoid cartilage is first to become ossified and is richest in bone-marrow, localized points of suppuration should be first sought for here.

LARYNGITIS AND TRACHEITIS, MEMBRANOUS (NONDIPHtheritic).—Jackson, in his discussion of a paper by T R Gittins on laryngitis and tracheitis in children, with special reference to nondiphtheritic infections (54th Annual Congress of Am

Laryng A (May) 1932), stressed the fact that these conditions are confused with pneumonic processes, whereas the child may be dying of bronchial obstruction. Postmortem shows the presence of an atelectasis and an obstruction of the bronchi. *Treatment* must be directed at drainage of the lower lobes through tracheotomy, and *diagnosis* in suspicious cases of croup must be aided by direct laryngoscopy. Since many cases may be diphtheritic, Jackson does not advise against use of antitoxin even though the Klebs-Löffler bacillus cannot be found. Intubation is less desirable than tracheotomy for obvious reasons.

LARYNGEAL PARALYSES.—

An interesting series of 217 cases of laryngeal paralyses are reported by G B New and J H Childrey (Arch Otol 16:143 (Aug) 1932) which disprove the Semon law. They have not observed a single case where the vocal cords changed from the median line to the cadaveric position, but rather that a vocal cord either returns to its normal function or pulls to the median line within a few months and remains there.

Important emphasis is laid upon compensatory muscular action within the larynx due to innervation by nerves of the opposite side, and the present-day theory of peripheral recurrent nerve paralysis involving early only the abductor muscle (cricothyroid muscle) and then later becoming a complete peripheral nerve paralysis, so that the shift is from the median line to the cadaveric position, is discarded. This is quite logical, it seems, because of the lack of evidence which might show that with complete destruction the cords move to the cadaveric position. The comparison to peripheral injuries of the facial nerve, which most often is complete, central

lesions or minute lesions at the peripheral nerve branches, may result in selective paralyses. It may then be considered that most abductor paralyses are complete peripheral recurrent nerve paralyses, but that in 90 per cent of the cases, innervation by nerves of the opposite side and adduction of the interarytenoid muscles prevent the cord from assuming the cadaveric position.

TUBERCULOSIS OF LARYNX.

—*X-ray Diagnosis.*—The x-rays are considered by A Thost (Beitr z Klin d Tuber 79:113 (Jan 20) 1932) to have a distinct diagnostic value. He points out that the former pathologico-anatomic investigations on the larynx have the disadvantage that the preparation of the specimens with strong acids causes considerable changes, especially in the calcium deposits. Since calcium has not only a physiologic but also a pathologic significance, x-rays made of the living structure, which show the distribution of the calcium, give information about the pathologic processes not detectable by means of histologic examination. In tuberculosis, the normal distribution of calcium and the ossification process are inhibited and replaced by a calcium infiltration. In older persons, in whom calcification has already taken place, the calcium decomposes, i.e., in tuberculosis there is a decomposition of calcium. In syphilis the process is entirely different. Here, osteophytes develop, and sharp, hard calcium bodies, star-shaped or spherical, are noticeable on the laryngeal skeleton as on other portions of the skeleton and corroborate the diagnosis of syphilis. Thus, the x-rays have diagnostic and differential diagnostic value. If tuberculosis and syphilis occur, the tuberculosis, as the stronger component, supersedes the syphilitic processes. Occasionally, how-

ever, the calcium outlines characteristic for syphilis are still visible. The x-rays also show all air spaces and accessory cavities of the upper respiratory tract, especially the small space of the sinus of Morgagni. If this space is absent in the picture, it is an indication that there is swelling and infiltration of the mucous membrane. Tuberculous processes frequently originate at this site, and, although they cannot be detected with laryngoscopy, they can be recognized in the roentgenogram. Another advantage of laryngeal roentgenoscopy is that it reveals changes in the cervical vertebræ.

Treatment.—Collapse therapy in laryngopulmonary tuberculosis was observed by A. T. Cooper and O. O. Benson (*Am. Rev. Tuberc.* 25:186 (Feb.) 1932), who found improvement of laryngeal pathology, paralleled with pulmonary improvement. They studied 106 cases of laryngopulmonary tuberculosis over a period of from 6 months to 6 years, to determine the effect of pulmonary collapse therapy on the laryngitis. Eighty, or 75.4 per cent, of the patients were suffering from far advanced pulmonary tuberculosis. Of the total number of these cases, 106, there was demonstrable improvement in the larynx in 43 cases, or 40.6 per cent, while 63, or 59.4 per cent, showed no such improvement. In a study of the results obtained after thoracoplasty, phrenic exeresis or pneumothorax it appeared that, on the whole, improvement in the pulmonary lesions was closely dependent on the degree to which the collapse therapy was satisfactory and that pulmonary improvement was paralleled by laryngeal improvement. In practically every patient, collapse therapy was instituted because of cavitation or progressive pulmonary tuberculosis. Laryngeal improvement occurred in a greater

number of patients than showed either a satisfactory collapse or demonstrable improvement in the pulmonary lesions. Forty-three per cent showed laryngeal improvement and only 33.9 per cent improvement in the pulmonary condition. This may have been due to a lessening of cough and expectoration with its resultant diminution in trauma of the larynx, even in a collapse not considered wholly satisfactory. It is noteworthy that 71.8 per cent of the patients with a satisfactory collapse had clearing of the laryngeal lesions, while only 28 per cent of the cases with an unsatisfactory collapse showed such improvement.

It appears to the authors that collapse therapy in laryngopulmonary tuberculosis is a valuable procedure. Many of the patients classified as "far advanced" can be greatly aided; life may be prolonged, distressing symptoms alleviated and, in many cases, the course of the disease changed from steady progression to one of improvement and healing. Tuberculous laryngitis is, as a rule, secondary to tuberculosis elsewhere, usually in the lungs, and its evolution closely parallels that of the pulmonary lesion. The *prognosis* of this complication remains grave, because it supervenes in the more advanced stages of the disease. Not only will the institution of a satisfactory pulmonary collapse of the diseased lung in laryngopulmonary tuberculosis benefit the pulmonary tuberculosis, but the tuberculous laryngitis tends to improve, and quite frequently the lesions in the larynx can be used as a reliable index as to the progression of tuberculosis elsewhere in the body.

LARYNGEAL CARCINOMA.—**Treatment.**—According to G. Tucker (*Ann. Otol. Rhin. and Laryng.* 41:36 (Mar.) 1932), early intrinsic cancer of

the larynx will be recognized when the profession fully realizes the possible significance of chronic hoarseness. Biopsy by means of direct laryngoscopy should be the final step in the diagnostic study. Early "anterior intrinsic cancer" of the larynx is amenable to cure by laryngofissure, which will save the patient's larynx as well as his life, with no operative mortality. The anterior intrinsic group includes a large percentage of all cases of cancer of the larynx. Laryngectomy will cure practically all recurrences after laryngofissure if the cases are properly followed. In 25 of 30 cases reported by the author, more than a year has elapsed since laryngofissure. There have been 2 recurrences in 2 patients, giving a proportion of lasting cure of 92 per cent. to September, 1931. One patient with recurrence is well, without metastasis, following laryngectomy. Partial laryngectomy with postoperative irradiation has given good results when there was a contraindication to laryngectomy in several cases not in the series. The author believes that laryngectomy will cure a large percentage of posterior intrinsic cancer if the diagnosis is made while the lesion is still recent.

N. Patterson (J. Laryng. and Otol. 47: 81 (Feb.) 1932) considers that the "window" resection operation is comparatively safe (only 1 of his 7 patients died as the result of the operation). The results as regards freedom from recurrence, if the patients are carefully selected, are perhaps as good as in total extirpation. The mutilation is infinitely less, and the outlook with regard to the voice, respiration, etc., may be as good as after laryngofissure. The author adopts Lack's technic with a few modifications. The underlying principle is to take away so much car-

tilage (thyroid or cricoid) that the tumor can be mobilized during removal. It does not seem to matter much whether a true window is cut in the thyroid ala or most of that structure removed. If the greater part of one ala and a portion of the opposite ala has to be taken away it is as well, when possible, to leave the upper edge of the cartilage. The author believes that the window method should be employed more often as an alternative to laryngectomy, the chief indications being when the disease is limited to the anterior portion of the larynx, but has crossed the middle line and involved both cords; extension of the tumor downward is no bar to window resection. So long as the growth is situated in front of the larynx it can be removed by taking away the anterior portion of the cricothyroid membrane and resecting that part of the cricoid cartilage which overlies the tumor. Once the laryngeal cavity is opened, the rest of the dissection can be continued with the growth exposed to view and all cutting done from the mucous membrane aspect. In the window procedure, the technic is much the same as that which is employed in removing a pharyngeal tumor by Trotter's technic.

XANTHOMA MULTIPLEX involving the larynx and trachea associated with diabetes insipidus was described by W. P. Finney, H. Montgomery and G. B. New (J. A. M. A. 99: 1071 (Sept. 24) 1932). They report 2 cases because of the rarity with which xanthoma has been known to attack the upper respiratory tract. In one case the involvement was extensive, being found in the oral, pharyngeal and laryngeal lumen. The larynx was so infiltrated that tracheotomy was necessary to relieve dyspnea. The other case

presented scattered nodules along the mucous membrane of the upper respiratory tract, involving isolated portions of epiglottis, arytenoids and vocal cords. Biopsy revealed their true xanthomatous structure. *Treatment*, consisting of x-ray, exposures to the region of sella turcica, both sides of neck, diet low in calories and fat, insulin and pituitary injections, pitressin nasal jelly, all proved of no avail, although these methods have occasionally been attended by success in the hands of others.

LEAD.—LEAD POISONING.—

Etiology.—Lead poisoning has been one of the troublesome affections occurring in industries with which the medical profession have had to deal. As pointed out by J. C. Aub (Bull. United States Bureau of Labor Statistics (Jan.) 1932) lead can enter the body in 3 different ways, *i. e.*, (1) through the intestinal tract, where it is absorbed, (2) through the pulmonary tract in the form of dust and fumes, and (3) through the nasal mucosa or through any other mucous membrane of the body. Aub pointed out that lead which was present in the lungs would cause poisoning much more easily than when taken in through the intestinal tract. The reason for this is that much of the lead in the gastrointestinal tract is never absorbed, but may remain there and cause no damage. Furthermore, part of that which is absorbed is taken up by the liver and again thrown back into the intestinal canal and excreted. Because of this double protection, the body does not receive so much lead from that present in the gastrointestinal tract. However, lead entering the circulation through the lungs goes directly all over the body.

Aub states that lead taken into the body through the nasal or pharyngeal

mucosa, or through the lungs, will cause as much poisoning as about 10 times the same amount swallowed. He points out that this is a new point of view. While much attention was given to having workers wash their hands before eating, and trying to avoid lead when chewing tobacco, these sources were less important in industry than exposure to dust and fumes.

Aub further states that if workers can avoid dust and fumes, the number of cases of lead poisoning will be greatly diminished. Painters develop lead poisoning from sandpapering dry paint, rather than from mixing paint. Using oiled sandpaper, now available, with which it is possible to wet down the paint with water, lead poisoning will be less frequent among painters.

Lead Within Body—As long as lead is present in the circulating blood stream it is dangerous, and it is important, as Aub points out, to be able to control that lead stream. Lead goes primarily to 2 places, *i. e.* (1) it is deposited in the liver and kidneys, and (2) in the bones. Soon after the lead enters the body, large amounts are found in the liver and kidneys. However, after exposure has ceased, practically all of the lead is found stored in the bones. The presence of lead in the soft tissues of the body as the liver, indicates that lead is still circulating in the blood stream and, in medicolegal proceedings, may be regarded as a possible contributory cause of death. So long as the lead remains in the bones, it apparently causes no damage, but if the individual becomes ill or develops pneumonia, or has a prolonged alcoholic debauch, or disturbs in other ways the inorganic salt metabolism of the body, lead may be liberated from the bones. This occurs because lead in the body responds to the same stimuli

that influence calcium, and when calcium is liberated from bones, then stored lead is also liberated. When lead is too rapidly freed, lead colic or some other manifestations of lead poisoning may appear.

Symptomatology.—The classical picture of lead poisoning is clearly defined, according to J. C. Aub (*Ibid*). Early evidence is that of general weakness, with loss of appetite and severe constipation, followed soon by lead colic, which is a very severe abdominal pain, moving over the entire abdomen, and always associated with constipation, usually of a severe degree. The paralyzes produced by lead are more severe manifestations, but, fortunately, now are relatively rare. Preceding the paralytic phase, there is a period in which the muscles are weak and fatigue develops prematurely. A painter may notice an inability to hold the hand extended for any length of time. This is a danger signal and should direct the attention of the physician to prompt removal from lead exposure.

Lead palsy is a paralysis of extensor muscles, whereas the flexor muscles are normal. The most characteristic type of paralysis is an inability to extend the fingers or wrist. The patient can easily hold objects, such as a pipe, and he may do other things, but it is accomplished with the hand well flexed on the wrist. The most fatigued muscles are those involved. Another manifestation rarely seen is *encephalopathy*. This may develop suddenly with convulsions, delirium and dementia, and possibly cause death. Lead colic and lead palsies cause incapacity, but lead encephalopathy causes death. The incapacity depends upon the severity of the conditions and the manner of treatment. Lead colic properly treated should cease within 24

to 48 hours, and the incapacity should not cover a period of more than 6 weeks.

While weakness of the wrist may cause an incapacity for at least 6 weeks, an established paralysis may mean a complete incapacity for 6 months. Lead encephalitis has a more indefinite incapacity period, and 50 to 75 per cent. of those cases die. The period of incapacity is that period in which symptoms and signs of injury from lead can be found. Lead may be present in the bones without evidence of damage to body tissues and this must be kept in mind.

According to C. F. McKhann (*Arch Neurol and Psychiat* 27:294 (Feb) 1932), lead poisoning in children produces a severe and dangerous form of cerebral involvement in which the symptoms apparently are dependent on the development of an extreme cerebral edema. Less frequently, there is encountered a peripheral neuritis commonly observed in adults with lead poisoning. Children who survive a severe lead encephalitis are frequently left with permanent neurologic disorders. The early diagnosis of lead poisoning based on a carefully taken history and physical examination, confirmed by x-ray and laboratory data, should lead to the institution of active therapy, which may result in the prevention of the development of serious neurologic manifestations. In the presence of the acute, severe cerebral manifestations, attention must be directed toward the control of greatly increased intracranial tension.

Diagnosis.—According to E. C. Vogt (*J. A. M. A.* 98:125 (Jan. 9) 1932), who describes the factors necessary for making an *x-ray diagnosis* of lead poisoning in infants and children, this condition is more common than is gen-

erally suspected and may be the cause of obscure neurologic and gastrointestinal complaints. The chief source of lead affecting the health of infants and children is paint chewed from furniture, woodwork and toys. Other sources are waterpipes, nipple shields and household utensils. When absorbed into the body, the lead is stored in the bones and can be detected on the films as a dense band at the growing margins of all bones, but most evident at the ends of the long bones and anterior ends of the ribs. This was observed in all of the author's cases in which a diagnosis of lead poisoning was made, and on which x-rays of the extremities were obtained. Deposition of the lead follows very closely the normal course of calcium, so it should be expected to be found the heaviest at the growing margins. The breadth of the bands, therefore, should give some idea of the duration of absorption as well as the amount absorbed. The elimination of the lead also can be grossly followed by the taking of films at intervals.

The author points out, in discussing the differential diagnosis by roentgenography, that, after all, the x-ray sign should not be exclusively relied upon, since, although very constant, it is not specific. In suspected cases confirmatory evidence is always to be sought, particularly a source of lead, for its removal is the most important part of treatment.

According to Aub (*loc. cit.*) it is important that a distinction be made between lead absorption and lead intoxication. As stressed by Aub, they are very different conditions. Most persons have lead absorption, because much of the dust on city streets has lead in it, and, therefore, many individuals are secreting lead in their urine. Lead ab-

sorption does not mean that an individual is poisoned by lead. Many persons are employed in lead industries for long times and absorb much lead without showing poisoning. In industries, however, one case of poisoning is likely to call forth the appearance of other cases. It is important, therefore, to differentiate those cases due to suggestion or malingering and here an invaluable aid is some objective sign, as the stippling of the blood cells.

End Results.—Aub (*loc. cit.*) points out that *arteriosclerosis* and *nephritis* have been said to be due to lead poisoning, but the evidence for arteriosclerosis is very meager. Aub states that the majority of individuals show some sclerosis after the age of 50 years. It is, therefore, ridiculous to compensate an individual who had been exposed to lead for a few months because he also has an associated mild arteriosclerosis.

Arteriosclerosis is produced by other causes as yet unknown, and the fact that an individual exposed to lead has arteriosclerosis is no indication that lead produced it.

The *neuroses* may be prolonged in individuals who have had lead poisoning. It is difficult to know whether these are due to the poisoning or whether they are prolonged by weekly compensation which patients receive. Since children suffering from lead poisoning may be irritable and nervous, it is possible that the poisoning may produce the neuroses. However, Aub states that in his experience these neuroses arise in individuals who have not been adequately treated, or in those suffering from severe lead poisoning, and he has not seen them in patients who have received thorough early treatment. The best way to prevent neurosis is to eliminate lead from the body early in the disease. When the

patient feels well, he should return promptly to work. If a neurosis has developed, the best treatment is to settle the case with a lump sum of money, and get the patient back at some kind of work, since they are more happy at work and when busy tend to lose their neurosis. Lack of work and weekly compensation prolong their worry and tend to chronic invalidism.

Treatment.—Keeping the above facts in mind, it is only necessary to control the circulation of calcium in the body in order to control the circulation of lead. On this theory the new treatment of lead poisoning is based, according to Aub (*loc cit*). A patient suffering from acute lead colic will require treatment directed to storing in the bones the excessive amount of circulating lead. To accomplish this, as much calcium as possible is prescribed, so that calcium is placed back into the bones of the body. When it is desired to eliminate lead, a low calcium diet is prescribed plus acid salts further to stimulate the body needs for calcium.

This is most important, since even though lead is in all of the bones and it is impossible to liberate all of it, that which is most readily available can be eliminated. There are numerous locations in the bones which readily give up calcium when there is a body demand for it. When acids are given, this very readily available calcium and the lead stored with it are liberated.

B. B. Koyranskiy (Soviet vrach gaz 11 641 (June 15) 1932) in recommending calcium chlorate administration in the treatment of lead poisoning, agrees with American workers that there is a close relationship between the calcium balance of the body and the lead excreted in lead poisoning, that the deposition of lead is mainly in the bone,

and that mobilization of calcium from bone into the general circulation also increases the discharge (due to increased cellular permeability) of lead deposited there. The author chose as indicator for lead intoxication the demonstration that the power of the extensors of the right hand becomes weaker in relation to the power of the extensors of the left hand. One of this group for study included 39 men, 14 of whom were working with lead dyes, and 25 in an accumulator plant.

A 10 per cent solution of calcium chlorate was administered internally at a dosage of 1 Gm (15 grains) a day for a period of 1 month. Three examinations were made with the extensograph every 10 days. Each determination was repeated 3 times at intervals of 5 minutes and the recorded reading was the average of all three. In 34, or 87 per cent, of the men this treatment was followed by an improvement in the power of the extensors of either one or both arms, and the influence was not limited to the extensors but to the body conditions generally. The author concludes that calcium may be administered in large amounts to persons in contact with lead products and that this may be of both therapeutic and prophylactic value.

THERAPEUTICS.—A. E. Osterberg, B. T. Horton, J. A. Borgen and F. W. Rankin (Proc Staff Meet Mayo Clin 7:231 (Apr 20) 1932) report their results with the use of the lead treatment in 95 cases of cancer classified as hopeless for the ordinary measures of treatment. In only 48 of these cases was an adequate dosage of lead administered, according to the authors. It is emphasized that although the tumor does not have absolute specificity in the removal of the lead from the circula-

tion, because considerable amounts of the material are found in such tissues as the liver and kidneys, the lead does accumulate in the tumor to a much greater extent than in the skeletal muscle or in a muscle such as that of the heart

The concentration of lead in the tumor was found to be increased over that in normal tissue 4- or 5-fold. Lead phosphate was administered and the most encouraging results were obtained when plumbism was produced, which usually resulted only after 400 mg (6 grains) or more of lead had been given. At the time of the report, 22 of the 95 patients were living 6 months to 2½ years after treatment was begun. All but 2 of the 22 patients manifested toxic symptoms from the lead. Nine of the 22 had severe plumbism.

In view of their results, the authors state that it is possible that this type of treatment of inoperable malignant lesions will develop a broader field of usefulness for those conditions which have hitherto been considered hopeless, and for this reason alone, its controlled continuation seems desirable.

LENS.—LUXATION.—In a series of 150 cases observed by R. Knobloch (Casop lék česk 70 1364 (Oct. 9) 1931), 93 were produced by trauma. He points out that therapy in these cases aims to improve vision and to prevent or cure secondary glaucoma. To combat glaucoma he recommends (1) extraction of the lens in all cases in which the luxation is into the anterior chamber and in those cases in which improvement of vision is possible; (2) cyclodialysis in all other cases.

LEPROSY.—V. G. Heiser (Proc Am Philosophical Soc Vol. 71, No. 4, 1932) considers that there must be sev-

eral million persons in the world who have leprosy and of this number about 2000 are in the United States.

Recent studies support the belief that a rapid reduction in the number of cases is possible. The author cites a striking illustration of the danger of the spread of leprosy on the Island of Mauru in the Central Pacific Ocean south of the equator. In 1920 there were 4 cases of leprosy in this island which had a population of 2500, in 1921 there were 60 cases, and in 1927 there were 337, or about 1 in 70 of the population. Only recently there was an outbreak of the disease in Holland.

Of the 2000 victims in the United States, less than 400 are at the colony. In leprosy, as in tuberculosis, knowledge to attack the disease by treating a link in the chain of transmission is still lacking. The organism of leprosy, the *mycobacterium*, has been isolated, but efforts to cultivate it have failed. It is not even possible to transmit leprosy to an animal. In the United States it ought to be possible to prevent the transmission of leprosy in the space of a few years provided all the afflicted persons were sent to the Federal Hospital at Carville.

PROGNOSIS.—So far as records show, it was not until the twentieth century that anyone recovered from leprosy as a result of treatment. Today, the Hospital at Culion, P. I., alone reports over 2000 persons as having recovered from the disease.

TREATMENT.—The results obtained, according to Heiser (*loc cit*) have been largely due to the use of chaulmoogra oil in some form. It had been known for some hundreds of years that chewing the bark, twigs, or leaves of the chaulmoogra tree had a beneficial effect on leprosy.

Recently, it has been shown that the administration of chaulmoogra oil causes fever in at least a certain percentage of cases. In Wayson's experiments in Honolulu, fever was caused and good results were obtained by injecting olive oil combined with sulphuric acid, and Denny, in Carville, has had similar success with the use of smallpox vaccine. It has long been known that hot baths have a beneficial effect, and it may be that the elevation in temperature, following their use, has given the hot springs of Japan their reputation as helpful agents in leprosy control. This opens up a promising lead in treatment.

LICHEN PLANUS.—TREATMENT.—In the opinion of H. R. Foerster (Arch Dermat and Syph 25:256 (Feb) 1932), x-ray irradiation of the spine is the most satisfactory form of therapy in generalized lichen planus, regardless of whether the disease is acute or chronic.

When definite improvement is not observed after 2 treatments, he considers it advisable to employ other measures, either alone or in conjunction with additional spinal irradiation. He also considers spinal irradiation useful in dermatitis herpetiformis, chronic generalized eczema, neurodermatitis and postherpetic neuralgia of herpes zoster.

LIVER.—CLINICAL AND PATHOLOGICAL ASSOCIATION WITH SPLEEN—J. W. McNee (Brit M J 1:1017 (June 4); 1068 (June 11); 1111 (June 18) 1932) has reviewed the clinical and pathological associations of the liver and spleen. It has been found that there are 2 great groups of diseases in which the liver and spleen are commonly involved together. In one group may be placed

the diseases involving the reticulo-endothelial system, including the anemias and leukemias, in the other group may be placed those diseases in which the reticulo-endothelial cells do not play an important part. In the latter classification, the association of hepatic and splenic disease may depend upon (1) some *anatomical* interrelationship which is disturbed, or (2) some *metabolic* interrelationship which has been disturbed. To have a thorough understanding of these associations, knowledge of the anatomy and functions of these 2 organs is essential.

Circulation.—"The liver and spleen contrast markedly in their vascular arrangements. Blood is conveyed to the spleen by a relatively large artery and returns through a very large and tortuous vein, without valves, to join the valveless portal vein. All splenic blood must pass through the liver before reaching the heart. The liver is unique in that much the greater part of the blood flowing into it, in the 'arterial' sense of other organs, is already venous and comes by the portal vein. The hepatic artery is very small in relation to the size of the liver, and almost two-thirds of the blood of this small arterial trunk is deflected away from the liver through the gastroduodenal, cystic and gastric branches of the hepatic artery."

Various experiments have shown that probably about 80 per cent. of the blood flowing through the liver is derived from the portal vein, the remaining 20 per cent. being supplied by the hepatic artery. Recent investigations have indicated that the portal blood is derived from the intestine, stomach and spleen in the ratio 2.74:1.23.095. The circulation of both the liver and spleen is probably affected by several factors, including arterial tension, nervous influ-

ences, or structural changes, producing alterations in portal blood-pressure

McNee believes that the splenic circulation is of 2 types a *direct* or ordinary one in which the blood passes from the artery into the venous sinuses and from there to the veins, and an *indirect* one dependent upon the contraction and enlargement of the entire spleen

Functions.—The 2 well-recognized relations of the liver and spleen are their vascular connections and the presence in each of the reticulo-endothelial cells No definite metabolic relationship has been established Both organs may act as blood depots, evidence having been produced that the spleen may retain blood cells for as long as half an hour, while the blood capacity of the liver is enormous

Well-supported evidence has been presented that an anatomical division of the liver into 2 lobes occurs along a line from the fundus of the gall-bladder to the groove made by the inferior vena cava The bile ducts have been shown not to overlap this boundary, but some anastomosis of blood-vessels does occur It has further been shown experimentally that there is a tendency for "stream-lining" in the portal vein, by means of which blood from various tributaries of the portal vein is conveyed to definite parts of the liver

Experimental ligation of the portal vein branches has been studied by many investigators The results indicate that the "portal vein supplies the hepatic glandular cells with the metabolic products on which they work, and cutting off of this supply causes atrophy of the cells from disuse, since their normal functions are no longer exercised" Compensatory hypertrophy of other portions of the liver occurs. If this hypertrophy is prevented by ligation of

bile ducts, the atrophy in the ligated area ceases, which may be explained by the hypothesis that metabolic products are absorbed into the general circulation and reach the liver cells via the hepatic artery

Ligation of the hepatic artery produces immediate necrosis of hepatic cells Partial obstruction of the hepatic vein results in necrosis of liver cells in the central portion of the lobules Fibrosis in the liver does not occur in any of these experimentally produced obstructions to the blood supply

I Nonreticulo-endothelial Diseases.—*Hepatic Cirrhosis and Splenomegaly*—The author believes that cirrhosis depends upon a progressive, frequently repeated process There is first "degeneration or destruction of liver cells followed by regeneration and replacement by new liver cells, but some overgrowth of fibrous tissue in the areas which are destroyed" The lesion is probably focal but frequently repeated In this process the entire make-up of the liver may be altered Especially is this true in the circulation In portal cirrhosis hypertrophy of the hepatic artery occurs, apparently in an effort to compensate for decreased portal flow. In this way, metabolic products reach the liver cells in spite of great interference with portal circulation

To account for the splenomegaly of portal cirrhosis, 2 hypotheses have been advanced The *first* is that splenic congestion occurs secondary to increased portal pressure McNee points out, however, that splenic enlargement occasionally occurs early in the disease before other signs of portal stasis appear, and that in only about 80 per cent. of advanced cirrhosis is the spleen enlarged at all The *second* hypothesis is

that the splenic enlargement is dependent upon absorption of toxins. This may be due to the fact that in portal cirrhosis more products are carried from the intestine to the general circulation via collateral vessels without being detoxified by the liver. *Hemachromatosis* is cited as one type of biliary disease quite definitely related to faulty iron metabolism. Various workers have suggested copper and manganese as possible causes of cirrhosis. Hypertrophic biliary cirrhosis is closely related to chronic hemolytic icterus. In view of these various facts, Eppelen suggested, in 1922, that cirrhosis of the liver must be regarded as a disease closely allied to diseases of the blood.

Banti's Disease—This disease, as described by Banti, has been the subject of much controversy. Pathologists, as a rule, have not accepted the views of the original author, since the same type of splenic changes are seen in other conditions. McNee states that "it seems certain that Banti's disease should be classified simply as the late stage of splenic anemia, or, what is perhaps even more apt, as an unusual type of ordinary portal cirrhosis in which high portal blood-pressure and changes in the spleen precede the onset of marked fibrotic change in the liver. The term Banti's disease should be deleted from our nomenclature, and all suitable cases classified in the category either of splenic anemia or of hepatic cirrhosis."

II Reticulo-endothelial Diseases of Liver and Spleen.—This group of diseases includes (1) hemolytic anemias; (2) disorders characterized by lipoid changes in reticulo-endothelial cells, and (3) chronic splenomegaly with reticulo-endothelial hyperplasia and giant cell formation.

1 In the first group, hemolytic anemias, are placed pernicious anemia and chronic hemolytic jaundice. In both these diseases it is believed that red cells are destroyed within reticulo-endothelial cells. The reason for hemolysis in either case is unknown. The Kupffer cells of the liver are increased in size and number. In the spleen, phagocytosis of red cells is also marked. More evidences of red cell regeneration in both liver and spleen with numerous cells of abnormal shape and size, are found in pernicious anemia, while in acholuric jaundice, the blood spaces are filled with normal appearing cells. Splenectomy apparently cures the latter condition.

2 Lipoid changes in reticulo-endothelial cells are found in a variety of conditions including Gaucher's disease, Pick's disease, Niemann's disease and the hypercholesterolemic splenomegaly sometimes found in diabetes mellitus. Great enlargement of liver and spleen may occur.

3 In the third group the reticulo-endothelial cells are greatly proliferated with increased reticulum of the spleen, causing very great splenomegaly in some instances. McNee suggests a low-grade chronic inflammation of unknown etiology as the causative factor.

HEPATOMEGALY AND SPLENOMEGALY.—Etiology.—In view of the fact that both the liver and spleen are subject to rather marked changes in size, and are usually easily palpated if enlarged, M. Barron and A. B. Litman (Arch. Int. Med. 50: 240 (Aug.) 1932) have studied a large series of autopsy reports from the University of Minnesota to determine as accurately as possible the conditions that may give rise to hepatomegaly and splenomegaly. From a group of 12,000 autopsies, cases

TABLE I
HEPATOMEGALY

	Total Number of Cases	Cases in Which Liver Weighed 4000 Gm or More *	
		Number	Per Cent.
1 Carcinoma	990	25	2.5
(a) Stomach	211	11	5.2
(b) Pancreas	80	6	7.5
(c) Liver	18	2	11.1
(d) Lung	62	2	3.2
(e) Rectum	53	2	3.8
(f) Colon	72	1	1.4
(g) Miscellaneous (vulva)	101	1	1.0
2 Melanoma	18	5	27.0
3 Leukemia	64	2	3.1
4 Amyloidosis	89	2	2.2
5 Hodgkin's disease	37	1	2.7

* Of the 35 cases in which the liver weighed more than 4000 Gm, 25, or 71.4 per cent, were due to metastatic carcinoma, 5, or 14.3 per cent, were due to melanoma, 2, or 5.7 per cent, were due 1 to leukemia and 1 to amyloid, and 1, or 2.9 per cent, was due to Hodgkin's disease. Eighty-six per cent were therefore due to carcinoma.

were selected in which the liver weighed over 2200 Gm or the spleen more than 300 Gm. These figures were taken because it was felt that organs of this size or larger should be palpable. Tropical diseases such as malaria, kala-azar, and amebic abscess, were not seen. No case of Gaucher's disease was found and hemolytic icterus and polycythemia vera were strikingly absent.

It was found that enlarged livers weighing less than twice normal were present in such a large variety of conditions that, by themselves, they proved of little value in differential diagnosis. "It is only when a true hepatomegaly of 4000 Gm or over is encountered—a liver that reaches down to the level of the umbilicus—that the enlargement becomes significant. The same holds true for the spleens weighing below 550 Gm. A spleen weighing 600 Gm is easily palpable, since it usually extends down to about 4 or 5 cm below the costal margin."

Heart Disease.—The condition of the liver was found to be of little signifi-

cance in heart disease, although since enlargement, if found, is indicative of passive congestion, it is an important finding to substantiate the diagnosis of *cardiac decompensation*. Splenic enlargement was seldom marked in this condition, although it may reach a size of 600 to 900 Gm.

Cancer.—Malignant tumors comprised the principal source of hepatomegaly, producing the enlargement in 86 per cent. of the livers weighing 4000 Gm and over. Melanoma produced the highest percentage of enlargement, while of the carcinomas, those primary in the stomach produced the largest number of hepatic enlargements. Tumors of the breast, prostate and uterus were seldom causes of hepatomegaly. The authors point out the fact that "not infrequently carcinomas and especially carcinomas of the liver may cause very high septic temperature similar to that seen in cases of portal thrombosis or hepatic abscess." The true infectious diseases of the liver, such as hepatic abscess and acute pyelophlebitis, seldom produce definite hepa-

TABLE II
COMBINED HEPATIC AND SPLENIC ENLARGEMENT

Primary Cause of Death	Combined Hepatic and Splenic Enlargement Per Cent	Enlargement of Liver, Per Cent	Enlargement of Spleen Per Cent
Leukemia	45.3	46.8	76.5
Gumma	33.3	66.6	57.1
Subacute bacterial endocarditis	27.5	27.5	85.0
Puerperal sepsis	17.3	23.0	40.3
Typhoid fever	16.6	16.6	33.3
Hodgkin's disease	16.2	16.2	62.1
Cirrhosis of liver	16.2	28.6	34.7
Abortion	10.8	12.7	16.3
Septicemia	9.8	17.6	31.3
Amyloidosis	9.0	13.5	11.2
Pernicious anemia	7.4	8.9	20.8
Melanoma	5.5	22.2	38.8

tomegaly, according to these writers. The spleen is seldom affected by tumor growth (less than 1 per cent showed definite splenomegaly).

Acute Infections—Infectious diseases such as pneumonia, peritonitis, meningitis, and typhoid fever produced only moderate enlargements of the liver and spleen, with few exceptions. Tuberculosis presented no important data except that it was the most common cause of amyloidosis. Primary tuberculosis of the spleen, though rare, produces a very large organ.

Alcoholism—Acute and chronic alcoholism was responsible for 22 per cent of the enlarged livers.

Cirrhosis of Liver—Contrary to the usual belief, the authors found no true hepatomegaly in this condition. About half the livers were found to be small, the others either normal or slightly enlarged. The spleens in this condition weighed more than 300 Gm. in 34 per cent and over 600 Gm. in 11 per cent.

Septic Conditions—Septicemia, puerperal sepsis and abortion showed only moderate, if any, hepatic enlargement, but occasional spleens weighing more than 600 Gm.

Amyloidosis—This condition was usually found in association with a suppurative lesion, combined enlargement of liver and spleen, and albuminuria. Tremendous enlargements were demonstrated in some cases.

Subacute Bacterial Endocarditis—Moderate enlargements were seen in both liver and spleen in 27 per cent of these cases, the spleen itself being enlarged in 85 per cent. No other acute infectious disease showed as high an incidence of splenomegaly.

Leukemia—"Leukemia forms the most important group in the enlargement of these organs, especially of the spleen." Seventy-six per cent showed splenic enlargement, 30 per cent weighing over 1000 Gm. In the entire series there were 7 spleens weighing 2000 Gm. or over, and in all of these the increase was due to leukemia.

Hodgkin's Disease.—Thirty-seven cases of this disease were found. In 9 the spleens weighed over 600 Gm. and in 2 over 1000 Gm. The importance of this disease in splenomegaly was second only to that of leukemia.

The authors conclude that marked hepatomegaly is found in only a few

TABLE III
SPLENOMEGALY

Cause of Death	Total Number of Cases	No in Which Spleen Weighed		Diagnostic Importance *
		600 Gm	1000 Gm	
Leukemia	64	35	19	4 plus
Subacute bacterial endocarditis	87	19	1	2 plus
Cirrhosis of liver	129	14		2 plus
Hodgkin's disease	37	9	2	3 plus
Heart disease	1505	8		
Acute infections	682	8	2	1 plus
Carcinoma	990	6	1	
Pneumonia	808	4		
Septicemia	102	4		1 plus
Amyloidosis	89	3	2	2 plus
Abortion	55	3		1 plus
Trauma	1042	2		
Pernicious anemia	67	2		
Puerperal sepsis	52	2		
Melanoma	18	1		
Tuberculosis†	317	1		
Gumma of liver	7	1		1 plus
Typhoid fever	24	1		
Peritonitis	364	1		
Nephritis	92	1		
Histoplasmosis	1	1	1	
Undetermined	146	1	1	

* Splenomegaly is of definite importance for diagnosis in leukemia, Hodgkin's disease, amyloidosis, subacute bacterial endocarditis, cirrhosis of the liver, and gumma of the liver

† Exclusive of cases with amyloidosis

conditions carcinoma, melanoma, leukemia and Hodgkin's disease, in which the differential diagnosis is not usually difficult. True splenomegalies are found principally in leukemias, Hodgkin's disease, amyloidosis, cirrhosis of the liver, subacute bacterial endocarditis and acute infections, the greatest cause being leukemia.

ACUTE YELLOW ATROPHY.

—*Etiology*.—S Weiss (M J and Rec 135 316 (Apr. 6) 1932) has reviewed the subject of acute yellow atrophy of the liver. Etiologically, many factors have been suggested, including pregnancy, infectious diseases and toxic agents. Of the latter, the arsphenamines are frequently cited, as are alcohol, chloroform, phosphorus, ether, trinitrotoluene (T. N. T.), carbon tetrachloride, trichlorethane, and cinchophen and its derivatives. Many reports

have appeared recently concerning the hepatotoxic effects of cinchophen products which include phenylcinchoninic acid, atophan, novatophan, atophanyl, diodoatophan, biloptin, oxyliodide, quinophan, agotan, neocinchophen, phenoguan, leucotropin, atophanurotropine, fantan, iriphan, tolysin, weldona, synthalin, etc. It is believed that any condition decreasing the glycogen reserve of the liver predisposes to damage by any toxic substance.

Symptoms.—The disease is characterized by progressive reduction in the size of the liver, jaundice of increasing intensity, and pronounced cerebral symptoms leading, in most cases, to a fatal issue. In the early stages, no intimation of the seriousness of the disease is presented, the illness usually being regarded as catarrhal jaundice. After days or weeks, tremors of mus-

cles, malaise, headache, coated tongue and jaundice increase. The temperature is usually not affected. Later, the pulse becomes more rapid, respiration irregular, sordes on teeth and gums, with a dry tremulous tongue, fibrillary twitchings and dilated pupils develop. The icterus then becomes more intense, vomiting and diarrhea may occur, and nervous symptoms, including restlessness, photophobia, headache, intense delirium and sometimes convulsions precede the final coma and death.

Physically the liver decreases in size while the spleen is frequently enlarged. Ascites may be present in the more protracted cases, according to Weiss. Urinary findings include increased concentration with increased bile pigment and urobilin content, casts and albumin are frequent findings, sugar is rarely present, urea and total nitrogen output is decreased, leucin, tyrosin and other amino-acids may be present. Blood findings include hyperbilirubinemia, decreased blood fibrinogen and decreased coagulability.

Pathology.—In addition to the well-known gross appearance, it has been found that there is a glycogen deficiency. Three stages of the disease have been described by J. A. Miller and A. Rutherford (*Quart J Med* 17:81 (Oct) 1923). The first is characterized by almost universal destruction of liver parenchyma. In the subacute stage there develops vascular and inflammatory cell reaction and early fibrosis. The third stage is one of regeneration, which occurs as multiple nodular hyperplasia. Jaundice may persist or disappear during the reparative process.

Diagnosis.—The diagnosis, according to Weiss (*loc. cit.*), is dependent upon the absence of obstruction, acute sudden appearance of jaundice, progressive

diminution in the size of the liver, the development of severe nervous symptoms and dilatation of the pupils. In the early stages, differentiation from catarrhal jaundice may not be possible, but the finding of amino-acids in the urine is suggestive. In icterus gravis (acute yellow atrophy) the pulse is usually rapid in counterdistinction to the slow pulse of catarrhal jaundice.

Prognosis.—The prognosis is extremely bad. In the majority, death occurs before the end of the second week. A small number progress to a subacute stage which may last 6 to 8 weeks.

Treatment.—This is directed against the formation of toxins and, if formed, to hasten their elimination. A diet rich in carbohydrates and low in proteins is advised. Intravenous carbohydrates may be used. Purgation and sedation are frequently indicated.

Weiss reports 3 additional cases of acute necrosis of the liver apparently due to the use of icterosan (a 10 per cent solution of atophan) during jaundice.

IN HYPERTHYROIDISM.—The relationship between hyperthyroidism and hepatic damage has been suggested by several authors. Although jaundice is an unusual complication, it does occasionally occur in toxic thyroid states, according to the literature cited by S. S. Lichtman (*Arch Int Med* 50:721 (Nov.) 1932). Cases of acute yellow atrophy have also been reported. Weller found a rather typical interlobar parenchymatous hepatitis, while other writers have described pathology varying from fatty changes to atrophic cirrhosis. J. B. Youmans and L. M. Warfield (*Ibid* 37:1 (Jan.) 1926) reported the results of liver function tests in cases of thyrotoxicosis and found a retention of tetrachlorphenolphthalein in

22 of 48 cases. However, Lichtman points out that most of these cases had other lesions which could account for the results.

Lichtman reports detailed liver function studies on 20 cases of hyperthyroidism, determinations of icteric index, urobilinuria, urobilinogenuria, galactose tolerance, tyrosine in the urine, and the author's cinchophen oxidation test (reviewed in the 1932 Supplement) were the tests used. In only 3 cases was the icteric index increased, and that to a slight degree. There were 6 instances of hypobilirubinemia. Van den Bergh determinations in 18 cases showed an increase. The galactose test was normal in all except 1 case—a diabetic who excreted 7.2 Gm of galactose. Abnormally high excretion of urobilin was found in 3 of 9 cases tested. Tyrosine was not found in the 2 cases examined. The author's cinchophen oxidation test was carried out in every case. Sixteen cases showed an abnormally high output of oxycinchophen, which is regarded as positive evidence of liver cell damage by the author. In 5 of the cases benefited by compound solution of iodine, the test later became normal, while in 4 of 7 cases in which no clinical improvement occurred, the test remained positive. No relationship was found between the basal metabolic rate and the degree of liver damage, as judged by the cinchophen test in the entire group, but in individual cases a reduction in metabolism tended to improve hepatic function. The author suggests that depletion of glycogen reserve in hyperthyroidism may possibly be responsible for the impairment of the liver cell function.

Observations of the pathologic anatomy and the correlated clinical findings in 107 cases of exophthalmic goiter by

Beaver and Pemberton (Proc Staff Meet Mayo Clin 7:566 (Sept 28) 1932) showed 3 predominating types of hepatic lesions: (1) acute degenerative lesions (fatty metamorphosis, focal and central necrosis, and changes secondary to stasis of blood), (2) simple atrophy, and (3) subacute toxic atrophy and toxic cirrhosis.

Acute lesions constituted 91.5 per cent of affected cases, of which 87.8 per cent were due to fatty metamorphosis, 50.4 per cent to central necrosis, and 5.6 per cent to focal necrosis. Atrophy appeared in 63.55 per cent and subacute toxic atrophy and cirrhosis in 39.81 per cent. Jaundice was present in 21.5 per cent of the series. Evidences of disturbed hepatic function were obtained in about 40 per cent of cases. The severity of hepatic disease is apparently dependent upon the severity of toxic goiter symptoms and the duration of the disease. It is suggested that the hepatic damage is more dependent upon a toxic factor than upon the existence of simple hyperthyroidism.

LIVER FUNCTION TESTS.—
Van den Bergh and Bromsulphalein.—A Cantarow (Am J M Sc 184:228 (Aug) 1932) reported the results of van den Bergh and bromsulphalein tests on 188 patients showing abnormal findings in either one or both tests. Experience of many workers has not borne out the hypothesis of van den Bergh that an immediate direct reaction indicates *obstructive jaundice*, while an indirect reaction was indicative of *hemolysis*. Recent investigators have found that the concentration of bilirubin in the blood alters the type of reaction obtained. Cantarow compared the type of van den Bergh reaction with the degree of icterus measured by the icteric index. It was noted in general that the

TABLE IV
BILIRUBINEMIA IN VAN DEN BERGH REACTION GROUPS

Icterus Index	Cases	Direct van den Bergh ^b			
		Negative	Delayed	Biphasic	Immediate
3 9	1	1			
6 1 to 10	44	42		2	
10 1 to 20	103	47	35	20	1
20 1 to 30	21	1	5	12	3
30 1 to 40	13		3	8	2
40 1 to 50	7		1	6	
50 1 to 60	12			6	6
60 1 to 70	3	.		3	
70 1 to 80	8	.		3	5
80 1 to 90	3			2	1
90 1 to 100	1			1	
100 1 to 120	2				2
120 1 to 140	4				4
140 1 to 180	2				2
Total	224	91	44	63	26

greater the concentration of bilirubin, the more likely a direct immediate van den Bergh reaction, although there is considerable overlapping of the various groups. Other investigators have concluded that, up to certain degrees, the bilirubin in the blood is combined by some constituent of the serum which prevents an immediate reaction. Increased amounts of bilirubin result in supersaturation of this combining power and a direct reaction is the result. It has also been found that certain "surface acting" substances lessen the absorptive power of this constituent (which is probably serum globulin). Bile acids and cholesterol are the most important of these "surface active" substances from a clinical standpoint. Cantarow found no relation between blood cholesterol levels and the type of van den Bergh reaction.

Some relationship seemed to exist between bromsulphalein retention and the type of van den Bergh reaction in many of the author's cases. There seemed to be a more direct correlation between

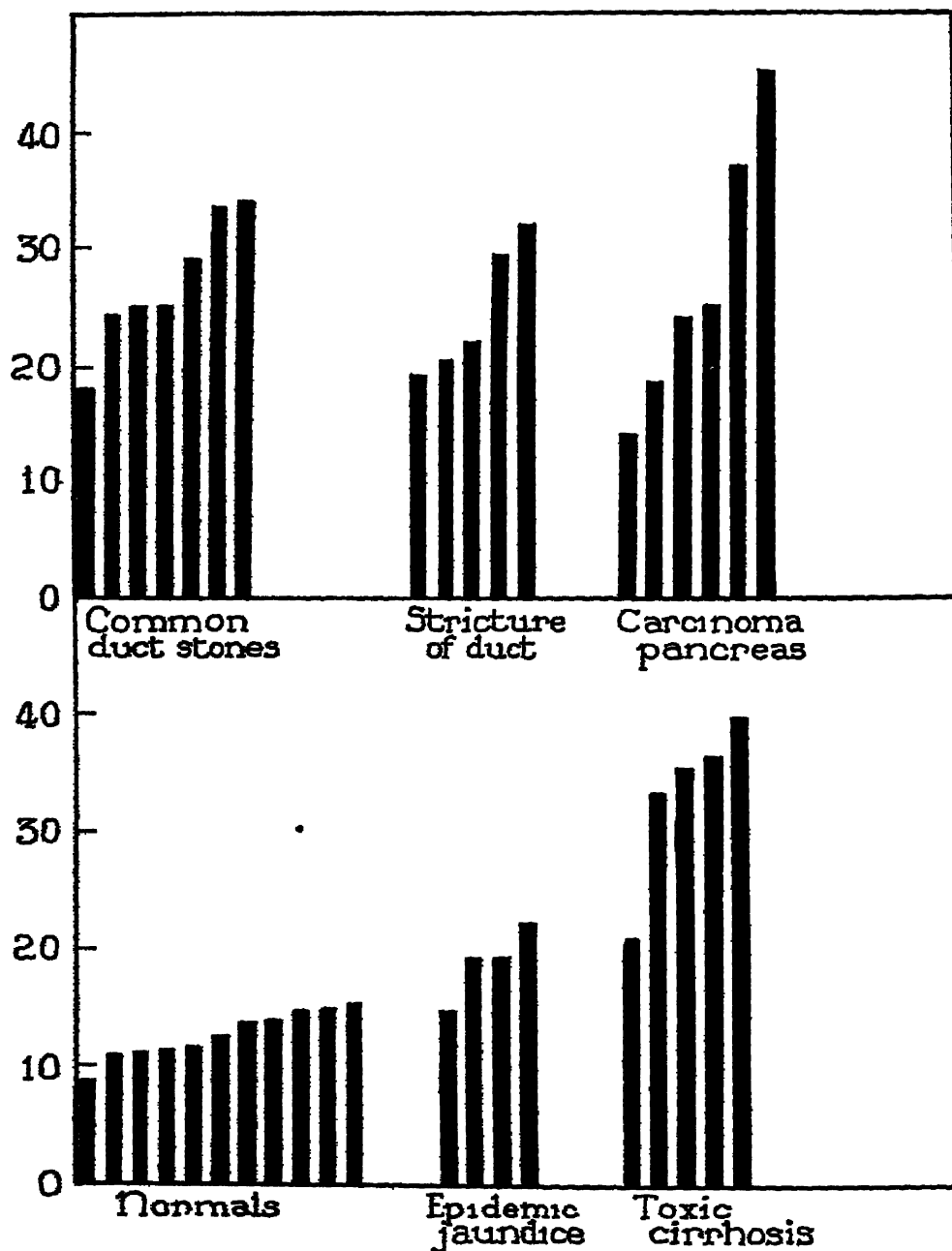
dye retention and van den Bergh reaction, than between degree of bilirubinemia and the van den Bergh reaction. It was also noted that in several cases of *cholecystitis* there was marked dye retention in the absence of an increase in serum bilirubin. This disturbance of dye excretion appeared to be "functional," since there was but slight evidence of liver damage and a rapid return to normal usually occurred after therapy.

The author believes that more complete liver function tests in surgical disorders of the biliary tract, with appropriate treatment preoperatively, would decrease postoperative morbidity and mortality.

Lactic Acid.—A. M. Snell and G. M. Roth (J. Clin. Investigation 11: 957 (Sept.) 1932) have investigated the blood lactic acid level as a possible index of hepatic damage. Animal experimentation has shown that in hepatectomized animals, lactic acid levels are increased, and that injection of sodium lactate causes a sharp increase

Lactic acid was determined by the method of Friedemann and Kendall. In normal persons at basal conditions the level lies between 8 and 15 mg

hepatic types of jaundice, and among patients with carcinomatous obstruction of the biliary passages" (See figure) No close correlation of the serum bili-



Content of lactic acid of blood in normal persons and in patients with various types of hepatic disease (A. M. Snell and G. M. Roth, J. Clin. Investigation)

per 100 c.c. of blood. "In general it was found that hepatic disease produced slight to moderate elevations in the value for lactic acid in the blood. The greatest rises were noted among patients who gave clinical evidence of severe intra-

hepatic types of jaundice, and among patients with carcinomatous obstruction of the biliary passages" (See figure) No close correlation of the serum bilirubin levels and lactic acid was possible, although the results in *hepatitis* were closely parallel in some cases. In *obstructive jaundice*, relief of the obstruction caused a gradual decrease in lactic acid levels, while failure to relieve

TABLE V

COMPARISON OF UTILIZATION OF SODIUM LACTATE WITH RESULTS OF
BROMSULPHALEIN GALACTOSE TESTS OF HEPATIC FUNCTION

Diagnosis	Sodium <i>r</i> -lactate Metabolism Test 4.5 Cc of Molar Solution Given Intravenously for Each Kgm of Body Weight			Bilirubin of Serum Mg per 100 Cc	Retention of Brom- sulphalein Grade	Excretion of Galactose, Gm
	Resting Value Mg	Maximal Rise Mg	Value at End of 2 Hours Mg			
Epidemic jaundice	15.3	60.9	28.9	4.3		4.5
Epidemic jaundice	14.4	45.5	13.1	5.2		3.4
Epidemic jaundice	12.2	53.0	12.2	25.0		3.7
Toxic cirrhosis	13.8*	26.3	12.5	13.6		5.0
Hepatitis from arsphen- amine	21.6	32.9	15.7	3.1		1.3
Hepatitis from cincho- phen	22.5	76.2	35.6	5.4		3.0
Splenic anemia	18.9†	50.0	23.0	2.0‡	3	
Metastatic carcinoma of liver	21.1	83.4	32.5	§	2	

* 10 grams of sodium *r*-lactate

† 2.25 cc of molar sodium *r*-lactate for each kilogram of body weight

‡ Indirect

§ Indirect, less than 1.0

the obstruction resulted in increasing amounts of lactic acid in the blood. Other factors such as fever, vomiting and muscular activity must be considered in interpreting lactic acid values.

An intravenous injection of 4.5 cc of a molar solution of sodium lactate per kilogram of body weight was given to a series of patients with hepatic disease. Blood samples were taken at 15, 60, 120 minutes. The utilization of the lactate was compared with the bromsulphalein and galactose tolerance tests in several cases, with the results shown in Table V.

While it was noted that, in general, lactic acid values were higher in hepatic disease, some instances of no appreciable change were seen. It is believed that while hepatic disease interferes with lactic acid metabolism, it does not entirely disrupt it. The authors further noted that in some cases of severe toxemia from hepatic disease, injection of

lactic acid resulted in considerable improvement.

Blood Cholesterol.—According to E. Z. Epstein (Arch Int Med 50:203 (Aug) 1932), considerable attention has recently been focused on the cholesterol metabolic function of the liver. Most workers agree that the greatest source of cholesterol is exogenous and that the absorption of cholesterol depends on the amount in the ingested food and the presence of fatty acids, bile and pancreatic juices in the intestine. Endogenous sources include destruction of red cells and other body cells, synthesis by the body, and mobilization from fat stores and the reticulo-endothelial cells. Thannhauser believes that the liver is the main excretory organ of cholesterol and regulates the relative content of the blood in cholesterol and cholesterol ester (the compound of 1 molecule of cholesterol with 1 molecule of a fatty acid). "One hundred

cubic centimeters of normal human plasma contains from 150 to 200 mg of total cholesterol, of which from 50 to 70 per cent is in the form of cholesterol ester "

Many investigators have found increased blood cholesterol in uncomplicated *obstructive jaundice* but no definite relation between the cholesterol level and the degree of jaundice in cases of liver damage as seen in cirrhosis, acute yellow atrophy, and pernicious vomiting of pregnancy. It has further been found that in cases of liver damage the values for cholesterol ester are below those of free cholesterol, and in severe cases the esters are greatly depressed or absent.

Epstein studied the cholesterol metabolism in various types of *jaundice*. In 43 cases of obstructive jaundice (neoplasm, stone, stricture, etc.) hypercholesterinemia was usually present, which corresponded to the severity of the icterus. With relief of the obstruction and the subsidence of jaundice, the cholesterol level gradually subsided. In about one-half of the cases cholesterol esters rose proportionally with the free cholesterol. In 8 cases there was a definite decrease in cholesterol ester, which was probably due to faulty fat metabolism in the intestine or to liver cell damage or both, according to the author.

Jaundice due to parenchymatous liver disease was present in 36 cases. The cholesterol level apparently varies directly with the severity of the liver damage. The cholesterol esters were even more indicative of the severity of the liver cell damage. In very acute and severe cases of hepatic degeneration with fatal outcome, the esters were absent throughout the duration of the disease. During recovery, the levels for

both total and ester cholesterol sometimes rose considerably above normal, possibly indicating a change from destructive to regenerative processes.

In 17 cases of *cholecystitis* and *cholelithiasis* without jaundice no marked variation was found in either total cholesterol or esters. Normal figures were also found in 10 cases of *atrophic cirrhosis* except in terminal stages or during acute complications such as hepatitis.

Carbohydrate Function (see Jaundice) —T. L. Althausen and his associates (Arch Int Med 48 667 (Oct) 1931), using a modified dextrose tolerance test, have continued their studies of liver function. In cases of *toxic cirrhosis* (Mallory), these workers found that while there was considerable dye retention in some instances, the carbohydrate function appeared normal. It had previously been found that the rosebengal dye test and the dextrose test gave similar results in most cases. In 3 cases of toxic cirrhosis, however, normal carbohydrate function was found in association with marked dye retention. The author explains these findings as follows: (1) "In toxic cirrhosis of the liver, vigorous regeneration of tissue maintains the carbohydrate metabolism regulating function and probably other metabolic activities of this organ." (2) Owing to a loss of the original structure of the liver in this disease, the new hyperplastic nodules lack connection with the bile channels, accounting in this manner for the marked impairment of dye excretion. (3) This information can be utilized by the clinician for differential diagnosis of toxic cirrhosis of the liver by the use of 2 suitable tests of hepatic function."

The same workers (Ann Int Med 6 193 (Aug) 1932) have studied the effect of insulin and glucose on the gly-

cogen content of the liver In normal rabbits fed glucose, the injection of insulin decreased the amount of glycogen deposited in the liver In rabbits with experimentally damaged livers the initial glycogen content was low, and the administration of glucose and insulin further decreased hepatic glycogen It was concluded that insulin should not be used in diseases of the liver

In an effort to determine whether reduced hepatic glycogen influenced the carbohydrate-regulating function of the liver, T L Althausen and E Thoenes (Arch Int Med 50 46 (July) 1932) studied rabbits after fasting and after the administration of thyroxine Fasting animals and those fed thyroxine showed an abnormally low glycogen content of the liver and responded to the insulin-dextrose-epinephrine test of the authors in an abnormal way However, the types of curve obtained did not correspond to that found in animals with liver damage The authors conclude that "it seems improbable that the described disturbance of the carbohydrate-regulating mechanism in man is caused by lowering of hepatic glycogen"

After hepatic damage had been induced by phosphorus, the same authors (*Ibid* p 58) found that the first deficiency to appear was a failure to maintain a normal blood sugar level Later, a progressive decrease in sugar tolerance appeared which was thought to be due to lack of deposition of glycogen following the insulin-dextrose test In the last stages, a typical hypoglycemic curve was obtained following the insulin-dextrose test. Epinephrine response was first increased, then decreased, and, finally, abolished

Gelatin Tolerance Test.—R. Mancke and K Rohr (Deutsches Arch. f klin Med 172 260 (Dec 21) 1931)

have reported that varying degrees of liver dysfunction can be demonstrated by a gelatin and water test Gelatin was administered by mouth and the urine examined for amino-acid content. In order to differentiate these results from that produced by diuresis, water tolerance tests were also used The results were checked by use of insulin-glucose tests and by galactose tolerance tests The authors found that in the normal person the amino-nitrogen in the urine was about 25 mg per 100 cc and after the gelatin test increased to 28 mg In *icterus catarrhalis gravis* there was frequently a spontaneous "hyperamino-aciduria," and a marked increase after ingestion of gelatin In milder cases without spontaneous "hyperamino-aciduria" the gelatin test produced a marked increase Alimentary amino-aciduria was also found in cases of *cirrhosis*, often before clinical signs of portal stasis

LUNGS.—ABSCESS.—Discussion continues about the questions of direct etiology, the bacteria responsible and the surgical treatment

In a discussion of putrid lung abscess, Neuhoof and H Wessler (J Thoracic Surg vol i (Aug) 1932) present an analysis of 100 cases seen by an associated group at the Mount Sinai Hospital during 1930-31

They state that, clinically, abscess of the lung is practically synonymous with putrid abscess of the lung Nonputrid varieties, such as those due to staphylococcus or pneumococcus, are not discussed, since their contribution deals only with the type of lung abscess that is commonly encountered as a clinical condition Lung abscess is far from rare, is usually serious, and is often fatal in the subacute and chronic stages.

Putrid lung abscess is a definite clinical and pathologic entity

Etiology.—The definite statement is made by Neuhoef and Wessler (*Ibid*) that "the infection is probably initiated and is certainly maintained by pathogenic anerobes," though the substantiating laboratory and experimental evidence is not recorded in this article in question. An exhaustive study of this bacteriologic aspect, however, was made by John Cohen (Arch Surg 24 171 (Feb) 1932), also from the Mt Sinai Hospital. A brief summary of the high points in the literature of the bacteriology of lung abscess is given, and the methods of procedure adopted in this research described in detail. In particular, the rôle of the anerobes was subjected to study because of the very suggestive findings by others, and because the characteristic clinical findings strongly suggested the anerobic origin although, Cohen says, "their presence in cases of abscess of the lung was entirely ignored in the later literature on the subject, probably because of the difficulty of their isolation."

In this study the composition of the media, various details of inoculation in order to promote growth of microorganisms, and procedures to assure strict anerobic surroundings are recorded in detail.

Bacteria.—In all cases *Streptococcus nonhæmolyticus* (Gamma-Brown) was found. This organism was a doubtful anerobe. In 1 case a strictly anerobic streptococcus was isolated which gave off a fetid odor, with gas, in fluid mediums containing dextrose. This organism corresponded in all its properties to *Micrococcus fætidus* (Veillon). The streptococci isolated were not all of one strain as shown by sugar reactions and serologic grouping. They were not

pathogenic when injected intravenously and under the skin. When 5 c.c. of a 24-hour culture in Smith-Noguchi medium was injected into the trachea by means of a bronchoscope, a localized pneumonitis usually followed.

Other organisms isolated were *diphtheroids*, *Micrococcus fætidus*, *B. ramosus*, *B. melaninogenicum*, *B. furcosus*, *B. thetoides*, *B. fragilis*, *Staphylococcus parvulus*, *B. fusiformis*, *Leptothrix*, *Vibrio*, *Clostridium cochlearium*. These were all anerobes.

Of the aerobic organisms isolated, *B. Friedlander* was isolated in 1 case and *Streptococcus viridans* in 2.

The summary of the bacteriologic findings show that in 16 patients, from whom pus was obtained at operation for pulmonary abscess the "doubtful" *anerobic streptococcus* and the *diphtheroid* was found in every case. *B. melaninogenicum* was found in 14, *B. fusiformis* in 6, *B. ramosus* in 8, *B. fragilis* in 5, *B. furcosus* in 2, *B. thetoides* in 3, *Staphylococcus parvulus* in 2, *Leptothrix* in 3, *Vibrio* in 1, *M. fætidus* in 1, and *Cl. cochlearium* in 1. This means that in 14 of the cases out of 16, a group of 3, *Streptococcus gamma*, *diphtheroid*, and *B. melaninogenicum* were found.

This study, therefore, strongly supports the statement that "the infection is probably initiated and certainly maintained by pathogenic anerobes."

Another statement follows: "It is of bronchogenic origin, and is due to aspiration of infective material. In our series of hundreds of cases there were only a very few instances in which the lesion could be interpreted as being embolic or probably embolic in origin. These rare exceptions presented clinical manifestations and pathologic changes quite different from those described in this paper."

Putrid lung abscess is believed to be due practically always to aspiration of infective material, although it is definitely recognized that such aspiration is neither invariably postoperative nor follows known aspiration. "About one-third of our series of the past 2 years occurred in previously healthy persons who presented no proved predisposing factor." This finding is corroborated by Hedblom, of Chicago, who in the discussion that followed said, "I am also of the opinion that aspiration of infected material from pyorrhea alveolaris accounts for a large proportion of pulmonary abscesses that develop without obvious cause. Over 20 per cent of the cases in my experience belong to this group of uncertain or unknown etiology."

"The concept of putrid lung abscess as a complication of pneumonia is also incorrect. Evidence is clear that the disease is not a complication of pneumonia, but that the so-called pneumonia was a putrid lung abscess from the onset. This is a matter of no little clinical significance, for the diagnosis can be made in the stage of so-called pneumonia in many instances."

The single abscesses which form without dilatation of the bronchi are discussed by J. Hunter (*Proc Roy Soc Med* 25 1135 (Feb 3) 1932). These are more common in men than in women and occur most often in the right lower lobe. In experiments on rabbits attempts were made to produce lung abscess by introducing into the trachea lipiodol mixed with ground glass and staphylococci, but in no case was it successful. Then lipiodol was mixed with staphylococci and introduced into the ear vein. This procedure produced lung lesions in every instance. The lesions varied from gray patches at the

periphery of the lung to typical abscesses.

Lung abscesses are due, therefore, to a combination of embolism and inhalation anesthesia, and by avoiding the use of this form of anesthesia, their incidence can be greatly diminished.

Pathology.—The development of the processes and their situation, determining factors in the surgical therapeutic approach, are easily understood on the basis of embolic origin and anerobic infection. Neuhof and Wessler (*loc cit*) state that "lung abscess begins in and distal to, one of the smaller bronchi at the site at which the aspirated infective material is presumably arrested. An intense necrotizing inflammation of the affected bronchus and its tributary bronchioles is the first stage. . . the pulmonary parenchyma soon becomes included in the severe inflammatory process. The lesion is thus always situated near the surface of the lung, and a pronounced and early reaction of the overlying pleura invariably occurs. Rapid destruction of bronchial walls and blood-vessels takes place in the involved area. A localized gangrenous abscess superficially situated is the result, containing foul pus and detritus, and liquefying sloughs of the lung. Its interior becomes smooth-walled at an early stage. Opening into the cavity are the patent mouths of one or more bronchi of the small order. Drainage by way of the bronchus (expectoration of foul pus) begins within 2 weeks of onset. A wide communication will permit sloughs to escape . . . and will thereby favor healing. If drainage and ventilation are incomplete, the pathologic process will persist. Experimentally it rapidly extends directly and by spill-over into other bronchi, to produce the pathologic picture of a rapidly fatal gangrenous

bronchopneumonia. In other cases there is a progressive necrosis of the parenchyma with rupture into the pleural cavity in the zone of adhesions."

Usually the process remains localized with occasional spreads, or insidiously involves the adjoining lung with early and marked fibrosis in the adjacent parenchyma. Where spread is subacute, and by spill-over, a multilocular abscess may ultimately result. With establishment of chronicity there is a dilatation of the bronchioles and bronchi about the abscess, with production of a bronchiectasis. This latter process may become so marked as to overshadow the primary lesion. The terminal stage of multiple abscess from recurrent spill-over and direct extension, bronchiectasis, and amyloid disease is beyond surgical aid.

If a terminal bronchiole has been the seat of block, a cortical lung abscess will develop. If drainage through the bronchiole is not adequate, the subpleural situation renders rupture into the pleura likely, the resultant putrid empyema or pyopneumothorax being usually limited by firm adhesions.

Symptoms.—Neuhof and Wessler (*loc cit*) state "that there is usually an orderly sequence of events in the initial stage." The incubation stage following a known aspiration is about 3 to 4 days—fever, chilliness or actual chill follow, with shortly "pain in the chest, a constant phenomenon usually severe and sharply localized." "A matter of great surgical significance is the fact that the site of localized pain is identical with the site of pleural adhesions." The pain lessens, not remaining constant; circumscribed tenderness is present. Early cough is likely to be nonproductive, the drainage pus, foul and copious, commonly appears suddenly about the tenth

to twelfth day after onset. "Early hemoptysis, varying from blood streaking to active hemorrhage, is never lacking."

The further course may be progressively downward, with increasing amounts of foul pus and development of sepsis, the picture closing early. A second course, if bronchial drainage is free, is one of fairly early recovery. The usual course is one of a temporary subsidence, then recurrence of inflammatory reactions and fetid expectoration, clubbing of fingers and toes and symptoms suggesting bronchiectasis.

A. T. Edwards (Proc Roy Soc Med 25 1150 (Feb 3) 1932) points out that from the standpoint of symptoms, abscess of the lung is of 2 types. In one type there is a continuous discharge and in the other type it is intermittent.

Complications.—Edwards (*Ibid*) urges early surgical drainage, as *cerebral abscess* occurs as a complication far more frequently in cases of undrained lung abscess.

Diagnosis.—Abscesses of the lung are classified by R. A. Young (*Ibid* 25 1131 (Feb 3) 1932) into (1) abscesses due to inhalation of foreign bodies or infective material, (2) abscesses originating in the parenchyma of the lung, also called "pneumonitis", (3) embolic abscesses, (4) abscesses from extension of adjacent suppurating structures, (5) abscesses resulting from the breaking down of newgrowths, (6) abscesses resulting from the traumatic perforation of the chest wall, and (7) gangrene of the lung. Conditions which simulate abscesses of the lung are interlobar empyema, bronchiectasis, and newgrowth. In cases of acute abscess, the patient may be very ill with severe fever and rigors, but a chronic abscess

may cause irregular fever. Cough and expectoration may culminate in the copious discharge of pus. The breath is always offensive, and in cases of gangrene is extremely foul. On standing, the sputum separates into 3 layers. Hemoptysis is common. The physical signs depend on the situation of the abscess. Clubbing of the fingers appears in from 6 to 8 weeks. X-ray evidence is most valuable because it helps to localize the abscess. When surgical treatment is needed x-ray examination is indispensable. Lipiodol may be of aid in excluding other conditions such as new-growth and bronchiectasis. Exploratory puncture should not be employed, as it may lead to widespread infection of the pleura.

P Kerley (*Ibid* 25 1143 (Feb 3) 1932) regards the x-ray appearance of lung abscess as the most important aid in the diagnosis. An embolic lung abscess seen in its early stages appears in the roentgenogram as a round, sharply-defined, homogeneous opacity. Multiple abscesses can be diagnosed only by means of the x-ray, but the examination must be made with the patient lying on the diseased side as well as in the erect posture.

According to Neuhof and Wessler (*loc cit*) the diagnosis can usually be made on the history and a careful survey of the clinical manifestations. Physical signs alone cannot be trusted because they are inconstant, being slight or absent in some instances and equivocal in others. When present, the signs consist essentially in a more or less localized area of dulness over which the breath and voice are diminished.

The x-ray is usually the deciding factor in diagnosis in the majority of instances. Cavity with fluid level is characteristic, but differentiation from a pyo-

pneumothorax may be difficult. Areas of predilection definitely related to the pulmonary segments to which bronchi of the third and fourth order are distributed are noted. One important fact can be stated, according to Neuhof and Wessler, mesially situated shadows invariably indicate lung abscesses occupying the posterior paravertebral parts of the lung.

So far as x-ray diagnosis is concerned, the typical film is found in only about 50 per cent of the cases, and the following is quoted *in toto* because of the importance of a broad understanding of the possible confounding clinical entities.

'1 *Film of Pneumonitis*—An abscess approximating the size of the shadow may, in fact, be present, and the assumed pneumonitis be the undrained abscess. We have followed a number of cases of lung abscess in which a fluid level was never seen in the area of supposed pneumonitis despite repeated x-rays taken over periods of many months.

2 *Film of pneumonitis with small fluid level*, ordinarily interpreted as a small abscess with surrounding pneumonia. Most of these cases are actually large abscesses with limited encircling pulmonary infiltration. The presence or absence of a fluid level depends on the accident of good or insufficient drainage through the bronchus.

3 *Films of apparent variation in the size* of an abscess are often deceptive. Apparent diminution in size is no evidence of improvement, unless accompanied by diminution in the extent of the enveloping infiltration.

4 *Disappearance of cavity* does not mean cure unless associated with disappearance of infiltration. Disappearance of cavity with increased infiltration not

only signifies persistence of the abscess, but also the unlikelihood of spontaneous cure

5 The film of *fibrosis* in chronic lung abscess. Cavities may not be recognizable as such. The films of the earlier stage must be studied in order to identify the site of the abscess in the midst of the fibrotic area

6 The film pointing to a *centrally situated abscess*. This may be the only possible localization from the x-ray. The lesion is either not a lung abscess or the localization is incorrect, because lung abscesses are always near the surface

7 The film of apparently *multiple abscesses*. In most instances the abscess is multilocular and not multiple, despite the appearance of completely separated foci

8 The film of *chronic lung abscess* may closely simulate that of fibroid tuberculosis. In addition, tuberculosis may be present in one part of the lung and an abscess in another. Furthermore, a putrid lung abscess occasionally occurs in the midst of unrecognized pulmonary tuberculosis. The latter may not be recognizable because we have not, up to the present, found tubercle bacilli in the sputum, while the putrid infection exists in such cases

9 The film may be strongly *suggestive of carcinoma* and not indicative of lung abscess. The differentiation can only be made by the history, general examination, and bronchoscopy

As a further aid in diagnosis *bronchoscopy* is advised in every case of subacute and chronic abscess, and in most of the acute as well. By its use, a single or multiple source of pus may be recognized, and especially the exact source of pus and, therefore, the precise location of the abscess. Foreign bodies, tumors,

bronchiectasis may be recognized or excluded. The statement is made that in the series "there were a number of cases in which a lung abscess was barely suspected, and in which the bronchoscopic examination established its presence"

Bronchography, using iodized oil, aids in localizing abscesses or recognizing causes of unsatisfactory progress. The work is advised under fluoroscopic inspection, with the aim in view of filling the bronchi of the involved area only. "The bronchogram of lung abscess is, therefore, an outline of all the branches of the bronchial tree with the exception of the one connected with the abscess"

Prognosis—"Whatever the evolution of symptoms, the course of a confirmed lung abscess is a progressively downhill one, with extension of the disease to adjacent and distant parts of the lung by direct invasion and spill-over. If untreated or inadequately treated, the disease is almost invariably fatal, death occurring from pulmonary complications or from cerebral or other metastases. *In adults death usually takes place within 3 years of the onset*, and in a much shorter time in the majority of cases. Unless early spontaneous recovery occurs, lung abscess is almost as fatal as cancer and usually kills more quickly"

Treatment—H. H. Cherry (Am Rev Tuberc 25.634 (May) 1932) believes that early and prolonged rest treatment of pulmonary abscess results in permanent healing in a much larger number of cases than is generally considered. Abscess engrafted on bronchiectasis, abscess due to Friedlander's pneumobacillus, or chronic abscess due to any cause responds poorly to this mode of treatment. Multiple abscesses heal not unlike single abscesses on rest therapy. Rest treatment, uneventfully

carried out, leads to one of two things (1) cure of the abscess, or (2) improvement of the patient's condition so that operative hazards are the fewest

V E Negus (Proc Roy Soc Med 25 1147 (Feb 3) 1932) discusses the bronchoscopic treatment of lung abscess. Invariably local anesthesia was used. Of 27 patients treated, 15 were cured by bronchoscopic treatment alone.

In referring to single abscess of the lung following operation on the nose, throat, or teeth, L S T Burrell (*Ibid* 25 1149 (Feb 3) 1932) states that there are 4 methods of dealing with such a condition: (1) leaving the patient alone; (2) bronchoscopy; (3) surgical drainage, and (4) pneumothorax. Pneumothorax is extremely dangerous, especially in cases of superficial abscess.

Edwards (*loc cit*) urges early surgical drainage.

R A Young (*loc cit*) states that the treatment should be medical until the suppurative process is localized. When rupture of the abscess occurs, evacuation of the pus should be prompted by postural drainage. Surgical treatment consists of bronchoscopic evacuation, thoracotomy, collapse treatment by artificial pneumothorax in selected cases or by thoracoplasty, phrenic evulsion, and lobectomy.

Medical treatment of lung abscess is considered by J Maxwell (*Ibid* 25 1141 (Feb 3) 1932) of little value. Intratracheal medication may have more favorable results. Such antiseptics as argyrol, lipiodol, and 10 per cent. gomenol in olive oil have been employed.

The procedures to be employed and the sequence of use permits of much discussion. Primarily, it is recognized that a sufficient tendency to spontaneous

healing exists, to bring about a cure in a fair number of cases. In the series under report 10 cases of acute abscess were not operated on because the clinical course was favorable and all are well."

Neuhof and Wessler (*loc cit*) consider that putrid lung abscess is a potentially surgical lesion from the outset. Discussion centers about measures employed previous to operation and to the variations in operative technic. **Postural drainage** is acknowledged to be of value by all. Drugs have no specific value. Georg (J of Thoracic Surg vol 1 (Aug) 1932) says "our treatment for cases of abscess of the lung has been rest for a period of at least 2 months during the initial stage of its course," after which, "patients who do not improve under medical care within 2 months should be subjected to **bronchoscopic or surgical treatment.**" Georg says that he has found **bacteriophage** to be of value, but amplifies his statement only by saying that the bacteriophage was supplied by the Michigan State Board of Health, and that he had in cases of pulmonary abscess given a series of 10 to 15 doses of 2 c c intramuscularly with good results. Dean B Cole, in the discussion of the papers of Georg and Neuhof and Wessler, took a radically opposite view and emphasizes that he considers the treatment of acute lung abscess to be primarily medical and seldom surgical. In treating some 125 patients with lung abscess, he found that most patients with acute abscess will recover without any treatment, other than **bed-rest** and **postural drainage.**

Bronchoscopy is given place largely as a diagnostic measure, and, if found useful, as a means of facilitation of drainage by removal of granulations, is

repeatedly employed for that purpose in *acute or subacute cases*. Nothing more than improvement in drainage can be anticipated from the bronchoscopic treatment of chronic lung abscess in the majority of cases.

Discussion centers about the employment of pneumothorax in the early stages. Neuhof and Wessler (*loc cit*) sum up their views of pneumothorax by saying "Pneumothorax is too dangerous and too dubious a procedure to have any place in the treatment of lung abscess." J. J. Singer of St. Louis, in a discussion of this phase of therapy, says

"In regard to pneumothorax, I would be inclined to differ with Neuhof. There are a certain number of cases which do lend themselves to pneumothorax treatment, but not to the type of pneumothorax that he is probably thinking about. This is an attempt to collapse the lung completely. For the same reason that pneumothorax, as a partial collapse of the lung, is used in tuberculosis, we have used it in certain types of lung abscess, particularly in those that seem to be away from the chest wall, as indicated by the x-ray. We have had a number of patients who have gotten well within 3 or 4 weeks after the introduction of a very small amount of air, merely enough to put the lung at rest and facilitate the drainage, but with no attempt at collapsing the lung."

Dean B. Cole (*loc cit*) agrees with Singer in the following: "I also desire to substantiate Singer's experience with pneumothorax in selected cases. While this procedure is seldom necessary, it may be employed with relative safety in any acute case which is draining into a bronchus, provided very small quantities of air, not more than 75 to 100 c.c. are given as indicated. This produces

a relaxation and not a compressive pneumothorax. It can be utilized regardless of the location of the abscess, but no attempt should be made to collapse the abscess cavity."

The counter discussion of Neuhof, in his reply to the above quoted men, indicates the importance of most careful consideration of the procedure. "Within the past 2 weeks there was a tragic case of lung abscess treated by low tension pneumothorax, followed immediately by a virulent putrid empyema, which resulted in the patient's death. I have seen at least 6 examples of such fatal putrid empyema, not only after the type of collapse pneumothorax to which 2 of the discussors referred, but also after low tension pneumothorax. In the autopsy upon the patient to whom I referred there was a small, well-localized, superficially-placed lung abscess, with delicate adhesions around its periphery and denser adhesions at its center."

His final statement is here quoted, in order that the conclusions, wrought by the experience of those who are so placed that prolonged observation of large numbers of cases is possible, may be generally available. "I should like to call attention anew to the fact that in follow-up, on a large series of cases, no more than 15 to 30 per cent recover spontaneously in the acute phase. That is, there is frequently enough apparent recovery, and then these cases go on to the subacute and more particularly to the chronic phase, in which they are so frequently classified as cases of bronchiectasis, or putrid bronchiectasis, or other pathologic process."

Phrenicectomy is given consideration as an adjuvant measure only, its true worth being difficult to estimate. According to Neuhof (*loc. cit*) phrenicectomy

tomy may possibly invite sufficient relaxation to assist in the healing of an acute abscess, but is of no proved value because spontaneous healing may occur in the acute phase

A less radical procedure in the surgical treatment of pulmonary abscess is suggested by F S Dolley (J Thoracic Surg 1 363 (Apr) 1932) His suggestion is one of a limited type of **extrapleural thoracoplasty**. As evidence of the value of the procedure he cites the recovery of 13 out of 14 patients on whom it was employed and records that 9 are sputum-free He states that it is chiefly among those cases where the pneumonitis surrounding the lung abscess is still extensive or continues to extend that the great percentage of operative deaths are found, and it is particularly for this type that the author offers the following procedure.

The location of the abscess with its surrounding pneumonitis is determined by x-ray, the direction of the lobar bronchus draining the suppurative area is determined by bronchoscopy A site in direct line with the bronchus draining the involved area is located at the point where the abscess is nearest the lung surface Under local anesthesia short portions of 3 or even 4 ribs are excised, together with the intercostal bundles, leaving for the floor of the wound the parietal pleura clear of muscles, vessels and nerves, except for the periosteum of the removed ribs which is left *in situ* The parietal pleura is not freed beyond the limits of the wound, since too great collapse may interfere with bronchial drainage by the falling together of the smaller draining bronchi already softened by inflammation The wound is packed very tightly with continuous 5-inch dry gauze and closed without drainage The area deprived of rib sections is strapped very tightly with adhesive, in order to restore as nearly as possible a solid chest wall for counterpressure in coughing

The wound is not opened for 14 to 18 days, unless infection demands it The wound is

then opened widely and the packing is removed It is at once replaced with gauze saturated with some antiseptic solution and left wide open. The packing is changed every 2 days until rib regeneration has firmly occurred, with the ribs in the compressed position If the collapse obtained by this procedure is insufficient, at a second stage another adjoining area is deprived of its ribs, to obtain further collapse and still another stage if deemed advisable Gauze compression, however, is limited to its original site After the primary compression-operation, further procedures are in the nature of well-circumscribed thoracoplasties and their number depends upon the area required for collapse to produce continuous improvement to a cure

Radical Surgical Treatment—The principles of the operation practiced by Neuhof and Wessler (*loc cit*) apply to resistant abscesses elsewhere in the body, with special attention to the factor of anerobic infection These principles are excision of the roof and ventilation The operation cannot be termed incision and drainage, which was the original procedure for lung abscess, so frequently followed by failure

They consider acute lung abscess a surgical condition, basing their view (1) on the described pathology of the disease; (2) the disclosure of overlying adhesions and a localized abscess in the lung at operation, and (3) the results of operation Operation in the acute phase they consider safer than in the chronic phase and the results as to definitive cure are far better Operative treatment of acute lung abscess is indicated if there is an increase in size under observation or if the clinical course points to the unlikelihood of a spontaneous cure. The exception is the rare and usually rapidly fatal type with spill-over infection and gangrenous bronchopneumonia. Operation is always indicated for sub-acute abscess It must be deferred in

the presence of an acute gangrenous extension. Operation is the treatment of chronic lung abscess unless in the irremediable stage.

Technical details to be observed are laid down precisely by Neuhof and Wessler. The abscess should be entered only through the zone of pleural adhesions. If no adhesions or insignificant adhesions are encountered, the approach is incorrect. The correct site must be found either at that time or at a later operation. The abscess is sought for by aspiration through the thickened pleura. Only a thin shell of infiltrated lung will be traversed in the majority of cases before foul pus and detritus are encountered. The aspirating needle readily discloses the abscess in most acute and subacute cases. In the chronic cases, however, many aspirations through the fibrotic lung may be required. When the abscess is found, *its roof is split open and later excised*. After evacuation of the contents, the interior is inspected for bronchial openings and recesses. The unroofing of all the ramifications of a chronic abscess may be exceedingly difficult, or even impossible at one sitting. The operation can only be considered completed when all recesses from and communications with the main cavity have been laid open. The abscess cavity tends to narrow quickly after operation, and should, therefore, be widely packed at the close of operation.

The wound should be healthy-looking and free from odor within a week. Regardless of whether or not there was a known opening of the free pleura at operation, a putrid empyema should be sought for if a septic course exists after operation.

The bronchial fistula or fistulæ are maintained until all traces of anerobic

infection have disappeared and pulmonary infiltration has subsided. Permanent fistulæ may be necessary in cases of long-standing chronic lung abscess. A patient can be termed well of a lung abscess only when there is lasting evidence of disappearance of pulmonary infiltration, and of anerobic (putrid) infection.

Comparing the 1930 and 1931 cases, Neuhof and Wessler find that there is a higher incidence of cure and lower operative mortality in the 1931 series, largely referable to greater precision in localization and more frequent operations for acute lung abscesses.

CANCER.—Etiology.—A Pirchan and H Siki (Am J Cancer 16 681 (July) 1932) report that by systematic clinical examination and by necropsies in particular, it has been established that lung cancer is highly prevalent in Joachimstal (Bohemia) miners. Necropsy was performed on 13 of 19 miners dying in 1929-1930. In 9 of these, pulmonary cancer was found (including 1 case of pleural cancer), 4 were non-cancerous. The anatomic form of the tumors showed no special features, most often a circumscribed form was found. With regard to *metastases*, the tumors showed various courses. In 5 cases there was generalization by way of the lymphatics as well as the blood stream. In 2 cases, metastases by the blood stream were almost exclusively present. The bones were involved in 4 cases. In 3, there was compressive myelitis due to metastases in the vertebræ. Metastases to the brain occurred in 1 case. Aside from the case of primary pleural carcinoma, microscopic examination showed oat-cell carcinoma 5 times and epidermoid carcinoma twice. In 1 case, 2 primary lung tumors of different structure were found, the 1,

fully developed, being oat-cell carcinoma, the other, quite small, epidermoid carcinoma. Both had caused separate metastases. The time spent in the mines amounted to from 13 to 23 years in the cancerous cases. Only 2 of the men belonged to the active staff, the others having been out of work for a period of from 1 to 27 years. The course of the disease was varied. In 3 cases there was a long history of specific symptoms (from 6 to 9 years). In the remaining cases the course was much shorter, the shortest duration of manifest symptoms being 10 weeks. It is highly probable that the tumors had developed for a considerable time before the first appearance of the symptoms, which, at times, were due to generalization. For this reason it was impossible to draw definite conclusions regarding the incubation of the tumors after the men had ceased work. This period in 1 case amounted apparently to 27 years. This long interval was probably one of latency due to the slow development of the tumor rather than a true incubation period. Unlike the Schneeberg cases, no notable degree of anthracosis or silicosis was found in the lungs of miners submitted to necropsy (with the exception of 1 who was noncancerous), so that no importance can be attached to this factor in the genesis of the tumors. Chemical analysis of lung tissue in 1 case gave a negative result as to arsenic, bismuth, cobalt, nickel, and uranium, neither could radioactivity be proved. As the most probable cause of the tumors, radon, which is contained in the air of Joachimstal pits up to 50 mache units, might be considered. A cumulative effect of small quantities of emanation inhaled for a period of many years may be assumed. This question, however, requires further investigation.

Diagnosis—P. Kerley (Brit M J 1 416 (Mar 5) 1932) states that there are 2 equally common x-ray manifestations of primary lung cancer. In one a lung or a lobe is involved in a pneumonic process, and in the other the disease appears to be limited to the hilus. Certain x-ray features are common to the two forms, but, as a rule, they maintain distinctive appearance to the end. The appearances of the lobar or pneumonic form vary with the number of lobes affected. Contraction of the lobe, as evidenced by displacement of the fissure, was first noted by roentgenologists and led to a revision of the preroentgenologic idea that neoplasms of the lung increased the thoracic contents. Primary lung cancer by obliteration of bronchi and destruction of lung tissue always diminished the thoracic contents. On closer study of an x-ray of a lobar carcinoma, it will be observed that the opacity is densest near the root and diminished in intensity toward the periphery. If a very hard picture is taken, 2 opacities can often be distinguished: the first, an extremely dense one attached to and spreading from the hilus, the second, a less dense one covering the affected lobe in all directions. These two shadows represent growth near the hilus and collapse in the periphery of the lobe. If the vascular markings of the lung are invisible in the light peripheral opacity and visible in the dense opacity near the root, carcinoma may be diagnosed with certainty, for there is no other lobar pneumonic process that produces this dual effect. In all non-malignant pneumonic processes the lung markings are either completely invisible or faintly visible in every part of the affected area. Diaphragmatic paralysis is an invaluable sign. A less well known disturbance of innervation associated

with carcinoma of the lung is compression or invasion of the vagus. Pleural effusion, as a complication of the pneumonic or lobar form of carcinoma, is the bugbear of the radiologist, for it masks nearly everything. If the effusion is small it has no significance, but if, as so often happens in malignant conditions, the effusion is large, difficulties will be encountered. The visualization of enlarged bronchial or mediastinal lymph nodes is one of the most valuable diagnostic points and is, moreover, of considerable clinical significance, since it contraindicates surgical intervention. An equally frequent x-ray manifestation of bronchial carcinoma is the so-called hilar form, which is seen as a dense opacity around the root of the lung, without collapse or consolidation in the peripheral parts of the affected lobe or lobes. This type of the disease is easier to diagnose than the pneumonic type, because there are few other lung diseases causing similar appearances. A sudden transition from the hilar type to the pneumonic type is not uncommon, and probably if the disease were seen early enough, it would be found first as a small hilar opacity, later causing lobar or lung collapse. Obstruction of the superior vena cava takes place earlier and more often with a growth of the hilar type than with one of the pneumonic type. It is obviously impossible to describe all the varying appearances that are to be seen in x-rays of pulmonary carcinoma. But there is one x-ray feature common to all malignant growths of the lung: there is never normal lung tissue between the shadow of the neoplasm and the shadow of the mediastinum.

It is pointed out by K. Steinthal (*Beitr z klin Chir* 155:515 (June 22) 1932) that pulmonary carcinoma is

frequently mistaken for a pulmonary abscess and that this is partly due to the peculiar location and development of the neoplasm. A second factor not yet sufficiently known is that pulmonary carcinomas have a tendency to metastasize to the skeletal system, particularly the thoracic and lumbar vertebræ, and that these bone metastases may become manifest earlier than the pulmonary focus.

A man, aged 40, with primary pulmonary carcinoma, 9 months previous to the development of the pulmonary manifestations, developed metastases in the lower thoracic and the upper lumbar vertebræ. The latter caused at first severe neuralgic pains. Because of wrenching and contusion of the spinal column which the patient suffered in an automobile accident, a traumatic tuberculosis of the spinal column was assumed and the pulmonary symptoms that later became manifest were thought to be the result of a bronchopneumonic pulmonary abscess that had no connection with the trauma. The problem was not definitely solved until the postmortem examination was made, because all those who examined the patient had not taken into consideration that prolonged fetid pulmonary abscesses may mask carcinoma, and also that pulmonary carcinoma may metastasize to the vertebral column and thus cause root symptoms before signs of pulmonary disease appear. X-ray examination of the vertebral column was not done until about a year after the accident and 9 months after the first appearance of the vertebral symptoms. Moreover, the changes that are characteristic for tumor (lessened density in the center of the vertebra with preservation of the cortex and of the intervertebral fibrocartilages) in contradistinction

to the typical tuberculous changes (destruction of the intervertebral fibrocartilages) were not given sufficient attention

Cases of this type indicate that the diagnosis of traumatic tuberculosis has to be made with great caution

Treatment.—W L Rogers (Arch Int Med 49 1058 (June) 1932) reports that primary carcinoma of the lung is a comparatively frequent finding in the larger pathologic institutes and that these tumors, in consideration of the time element from the first symptom to death, run a rapidly fatal course. The few patients with early suggestive pulmonary symptoms should be examined with great thoroughness, all the measures available being used to help in establishing an early diagnosis. By so doing, the percentage of diagnoses made may be increased while the tumor is confined to one lobe. In such a group lobectomy is indicated as a possible measure.

For the large percentage of cases in which operative intervention is not indicated, x-ray or radium therapy may considerably retard the growth and spread of the cancer and also help to alleviate disturbing symptoms caused by metastases.

Carcinoma of the lung should be classified with that of the mamma, thyroid, prostate and suprarenals, as showing a very early tendency toward metastasis to bone.

EMBOLISM AND INFARCTION.—**Incidence.**—A series of 64 cases of pulmonary embolism with or without infarction, which came to autopsy at the Albany Hospital, Albany, N Y, in the period from 1921 to 1929, are reviewed by K Hosoi (Ann Surg. 95.67 (Jan) 1932). These included 25 cases of postoperative embolism, 3

cases of post-traumatic embolism, and 36 medical cases of embolism.

Sex did not seem to be of importance in the incidence of the condition, but age was evidently a factor, as the frequency of embolism increased very rapidly after the fortieth year. Trauma at the time of operation did not appear to be of importance but infection increased the danger. After general surgical operations the incidence of embolism was 0.09 per cent, and after gynecological operations, 0.08 per cent.

In 64 per cent of the cases the condition developed within 2 weeks after the operation. The duration of symptoms from the onset of the embolism to death varied up to 10 days, but 80 per cent of the patients died within 3 days. In the cases of medical embolism the duration of symptoms was longer (as long as 27 days), probably because of the greater frequency of smaller emboli occurring sometimes in showers. Only about one-third of the deaths occurred within 3 days.

Of the postoperative emboli, 42 per cent lodged in the lower lobes of the lung. The right lower lobe was involved twice as often as the left lower lobe. Another 42 per cent of the postoperative emboli lodged in the main pulmonary artery or in one or both of its 2 main branches, most frequently the right. In the cases of medical embolism, the less massive emboli were able to reach the smaller branches of the pulmonary artery. In 64 per cent of the cases the lower lobes were involved, but contrary to postoperative infarction, medical infarction occurred more often in the left lower lobe than in the right lower lobe.

Manifest infection was present in only 32 per cent of the postoperative cases and in 50 per cent of the medical cases.

FIBROSIS.—Pathogenesis.—W S Lemon and G M Higgins (Am J M Sc 183 153 (Feb) 1932) believe that the fibrosis of the lungs produced in workers exposed to dusty atmospheres, especially those in which fine particles of silica make up the larger percentage of the dust, is an end-product and represents a progressive defeat of the protective mechanisms of the body. It is never found until the lung fails to rid itself of dust carried out of the bronchi by ciliary action or of dust carried through the lung by way of the lymphatic channels. With the breakdown in the carrying mechanisms, the burden of protection is the phagocytic cell, which, with its load of engulfed material, passes to all parts of the lung and ultimately becomes immobilized in those portions of parenchyma in which lymphatic tissue is abundant. The cells concerned are polymorphonuclear leukocytes, which are the first to appear, to disintegrate and to disappear, and clasmatoocytes, which appear later, are extremely active, break up less rapidly, and may become transformed into fibroblasts. In association with the tissue fibroblasts, the clasmatoocytes form scar tissue. Finally, fibrosis is the result of the action of substances secreted by the cell on the foreign particles. If a tissue poison results from chemical action, fibrosis is encouraged, and is progressive, lasting as long as the unaltered irritant remains in the lung.

FOREIGN BODIES.—Attention has been called by C Jackson and C L Jackson (Arch Otolaryng 15 860 (June) 1932) to the fact that *pins* at the periphery of the lung are practically always lodged head downward. This may be due to the catching of the point and the tumbling over of the head end, and partly to the fact that the head end

is the heavier. The primary cause of pins in the lungs is carelessness in putting pins in the mouth. The secondary etiologic factors are numerous. The cause of the pin reaching the periphery is a pawl and ratchet-like action of the pin, the head is free to move downward during inspiratory elongation of the bronchi, and the joint catches and resists upward movement during the bronchial shortening of expiration and coughing. The limit of downward travel is the smallest bronchus that the head of the pin can enter. After the initial choking, gagging and coughing, there is, in the case of pins at the periphery of the lung, a symptomless interval of a number of months. Sooner or later, however, suppurative changes, with productive coughing and progressively increasing impairment of health, supervene, and a fatal ending may eventually occur if the pin is not removed. All pins at the periphery of the middle and lower lobes and descending branches of the upper lobes can be removed through the mouth by peroral costophrenic bronchoscopy. The ascending branches of the upper lobes present great difficulties, but fortunately their invasion by pins is exceedingly rare.

Localization by X-rays.—The localization of certain opaque foreign bodies in the tracheobronchial tree is attended with great difficulty when the diseased area of lung is of a density almost as great as that of the foreign body, according to H K Pancoast, E P. Pendergrass and G Tucker (Am J Roentgenol 27 225 (Feb) 1932). In 2 illustrative cases the foreign bodies could be seen clearly in roentgenograms made with the use of the Potter-Bucky diaphragm, but were not visible on the x-ray screen. In order to guide the bronchoscopist with the biplane roent-

genoscope, opaque markers were placed upon the skin in fixed relation-ship to the foreign bodies. By this method, the safe removal of foreign bodies that cannot be localized by ordinary procedures, is permitted.

However, as it is much more difficult and dangerous than bronchoscopy under direct vision, it should be used only when bronchoscopy by direct vision cannot accomplish the desired result. It should not be employed to make up for inadequate training of the bronchoscopist. As safe localization requires guidance in 2 planes at a right angle, x-ray bronchoscopy should not be attempted unless biplane guidance is possible. There must be perfect co-operation between the roentgenologist and bronchoscopist. Greater skill is required of the bronchoscopist during x-ray guidance than when he is working by sight.

MILIARY DISEASE.—*Etiology.*
—R. R. Sayers and F. V. Meriwether (Am J Roentgenol 27 337 (Mar) 1932) describe about 125 cases of typical miliary lung disease as having been found by x-ray examination among 18,000 individuals during routine physical examination. A majority of the patients did not have sufficient symptoms to cause them to stop work or to seek medical aid. The most characteristic observation was a large number of discrete, dense, shot-like spots scattered over the lung areas. Tubercle bacilli were present in only 2 of the 88 cases in which an examination was made of the sputum. Unstained smears of 31 cases (all those examined) were positive for fungus. Two types of fungi were identified—*Aspergillus fumigatus-fisheri* and *Aspergillus niger*. Ten cases tested with antigen of *Aspergillus fumigatus-fisheri* gave negative reactions; 6

cases tested with *Aspergillus niger* all gave positive reactions. The authors believe that 38 cases reported by Sutherland as "miliary calcification of the lungs" probably represent the same condition and that these miliary calcifications may be due primarily to fungus infection.

SILICOSIS.—*Etiology.*—Three cases are reported by E. M. Chapman (J A M A 98 1439 (Apr 23) 1932), in which acute silicosis was recognized as a result of comparatively short exposure to alkaline silica mixtures in the manufacture of scouring soaps; probably due to the accelerated formation of silica hydrosol.

Pathology.—F. W. Simson (Proc Transvaal Mine Med Officers' 10 4 (Mar) 1931), in a study of the reaction on the part of the lungs to the effects of dust inhalation, shows that the anatomical structure of the air passages tends to protect the lungs in 3 principal ways, *ie* (1) by the action of the lining ciliated epithelium; (2) by the action of the musculature in the walls of the air passages, and (3) by the part played by the alveolar phagocytes and the lymphatic apparatus.

When an excessive amount of dust is inhaled, some of it reaches the lower air passages. In the bronchi and bronchioles the particles tend to adhere to the moist surfaces of the walls, and by the action of the cilia of the lining cells they are propelled towards the larynx and subsequently become removed in the sputum. The action of the ciliated epithelium is assisted by contractions of the bronchial musculature.

If this first line of defence is passed and particulate matter reaches the alveoli, the cells lining the alveoli are stimulated to activity. They swell up, become detached from the walls, and de-

velop an active phagocytic function. The particles are phagocytosed and are then carried in one of two directions. Some of the phagocytes, now laden with

cells accumulate in these situations and cause a condensation of the tissues about the entrance to the primary unit. During the period of excessive dust in-

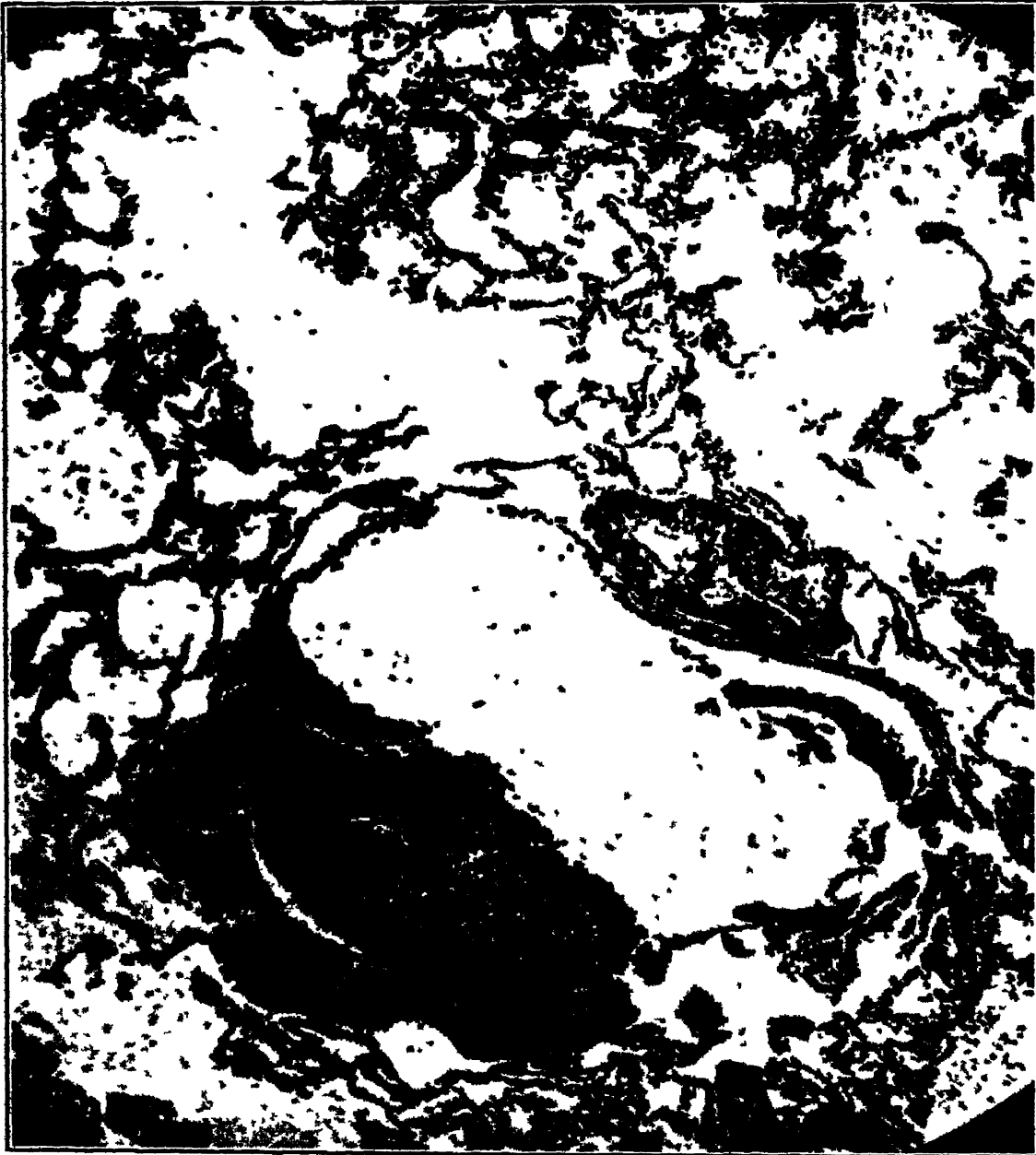


Fig 1—Photomicrograph. Commencing nodule formation. A terminal bronchiole is shown with a related aggregate of pigmented "dust cells" in which a commencing nodular silicotic fibrosis is seen. The focus of fibrosis is still in the cellular stage. (Simson, Strachan and Irvine. Proc Transvaal Mine Med Officers' Assoc, 1931)

dust, pass to the terminal bronchioles, whence they may be removed in the sputum. Others pass into the walls of the vestibules and terminal bronchioles. In time, large numbers of dust-laden

halation, and possibly for a short time afterwards, dust cells are continually arriving at, and entering, the areas of condensed tissue at the entrance to the primary unit. While some cells are

arriving, others leave the condensed areas and enter the regional lymphatic vessels, along which they pass to the minute masses of lymphoid tissue, which

and causes it to become hyperplastic. With continued arrival and accumulation of dust cells in the lymphoid masses, more or less well-defined aggregations



Fig 2—Photomicrograph Silicotic massive fibrosis of noninfective type. This section shows numerous contiguous composite and single islets which macroscopically formed a single area of massive fibrosis of noninfective type. Note the absence of significant change in the alveolar walls in the top left-hand corner. A biological test for the presence of tubercle bacilli was performed in this case with negative result. (Simson, Strachan and Irvine. Proc Transvaal Mine Med Officers' Assoc, 1931.)

lie between branches of the pulmonary artery and the adjacent bronchioles, vestibules and atria. The presence of the dust cells stimulates the lymphoid tissue

are formed. The site of an aggregation is only capable of retaining a limited number of dust cells, so that with new arrivals an overflow takes place. The

cells comprising the overflow, and others which have escaped arrest, pass onward in the peribronchial and perivascular lymphatic vessels, finally to be trapped in the lymph nodes at the root of the lung. In silicosis, these lymph nodes are the first sites to show fibrosis.

If inhalation of injurious dust, other than silica, *e g*, asbestos dust, is continued over a long period, or with shorter exposures when the concentration of dust is great, a diffuse cellular fibrosis occurs in the walls of the bronchioles, vestibules and atria. The fibrosis tends to extend locally, involving the supporting connective tissue of the adjacent blood-vessels, and, to some extent, the walls of the alveoli in the immediate neighborhood. There is usually desquamation of the epithelial lining of bronchioles and vestibules, often without evidence of a definite exudate. In very advanced cases of the condition the fibrosis may extend to the septa, to the supporting tissues of the bronchi and larger blood-vessels, and to the alveolar walls. Even in these cases the greatest degree of fibrosis is localized to the supporting tissue about the entrance to the primary unit. It may advance to such a degree that the bronchioles become constricted, sometimes retaining their circular outline in cross-section, sometimes being reduced to mere slit-like openings. Rounded nodules of cellular character are sometimes seen, but the dense hyaline type of nodule is usually absent. Dust containing only a small percentage of silica may also give rise to these changes, and there is greater liability to generalized fibrosis when a low grade type of infection (not necessarily of tuberculous origin) complicates the dust effect.

The changes just described appear to be the primary lesions caused by the in-

halation of any injurious dust, but when the great majority of the inhaled particles are composed of or contain silica, there develops, in addition, a specific and localized type of fibrosis—the silicotic islet.

Formation of Silicotic Islet of Non-infective Type—The first evidence of this specific and localized lesion is seen in the aggregation of dust cells which probably represents the site of the lymphoid mass. In the center of an aggregation, a small rounded area of fibroblasts appears. With further development, a central core of dense fibrous tissue is laid down. It often becomes hyaline in character and, in the case of larger and older nodules, takes on a whorled arrangement. A fully formed single silicotic islet consists of a central mass of dense hyaline fibrosis, arranged in whorls. This is surrounded by a comparatively narrow zone of cellular fibrosis, laid down in concentric laminae. Scattered through this mass, lying between connective tissue cells and fibrils, there are scanty large and small round cells and a little particulate matter. In suitably stained sections, a deposit of fat may also be seen, the degree varying with the age of the nodule. The early fibrotic nodule, thus formed, is surrounded by numerous dust cells. The growth of the silicotic islet continues by successive new arrivals of dust cells and a subsequent extension of the fibrosis at the periphery of the fibrotic nodule.

In the deep substance of the lung a simple silicotic islet may be single in the early stages, but in most cases the larger islets are of composite character. The composite islet is formed by the coalescence of 2 or more single islets, each of which has developed in relationship to some part of a given primary unit. The composite islet, though easily recognized

as such microscopically, appears as a single structure to the naked eye and when palpated

With the growth of the specific fibrotic islet of silicosis, the initial diffuse fibrosis in the walls of the terminal bronchioles and vestibules becomes masked, and the anatomical relationships become increasingly difficult to identify. The growing islet, especially if composite, displaces and distorts alveolar walls and blood-vessels, and the terminal respiratory passages, some, or all, of these structures may be incorporated in a composite nodule

In a developed condition of silicosis, the silicotic islets are to be found distributed through the deep substances of the lung and also just under the visceral pleura

In the deep substance of the lung the noninfective islet, whether single or composite, develops almost without exception *in the region of the entrance to the primary unit* or lobule.

Islets which develop *in relation to trabeculae* form an exception to this rule, but trabecular islets are relatively uncommon

The islets which develop *under the pleura*, on the other hand, are often very numerous, and may appear in considerable numbers when few or none are present in the deep substance of the lungs

The trabecular and subpleural islets, however, resemble each other in the fact that they are in each case usually single and not composite. They probably take origin respectively in the lymphoid tissue, which has been described as occurring between the alveolar walls and the trabecular and subpleural connective tissue. The approximation of the lymphoid tissue to the alveolar walls in these situations suggests that the trabecular

and subpleural islets also develop in relation to the primary units. They occupy, however, a position at the periphery of the lobule in contrast to those which develop in relation to the terminal bronchioles at the entry to the lobule

But it would appear that, although there are 3 possible sites in which an islet may develop the site is always one which is easily reached by dust cells which have phagocyted pigment and dust in the alveolar spaces

Apart from the individual single or composite palpable islet, noninfective silicosis may appear as a "massive" type of fibrosis. Seen microscopically, such lesions consist of numerous contiguous single and composite islets. The fibrosis is of the same character as that of the single islet. There is no evidence of breaking down. The intervening alveolar tissue is much compressed and collapsed, but there is no evidence of inflammatory infiltration, nor of definite matting together of the individual islets. The larger blood-vessels, as a rule, are not constricted

Biological tests with material from simple silicotic islets and from massive silicotic fibrosis of noninfective type, have given uniformly negative results for tuberculosis

Infective Silicosis—The term "infective silicosis" is used in a special sense to designate not the mere conjunction of silicosis with infective processes, but the characteristic and distinctive lesions marked by excessive fibroid reaction which certain infections are apt to produce in the silicotic lung. Such lesions are most commonly the result of tuberculous infection, and to these, the term "tuberculo-silicosis" is applied, but reactions of a broadly similar type may result from other infections, *e g*, from local "pneumonias," and the general

term "infective silicosis" is used to include these conditions also. For the present purpose, however, this characteristic reaction to infection in the sil-

either from a hitherto latent focus within the lungs or elsewhere in the body, or as a new infection from without

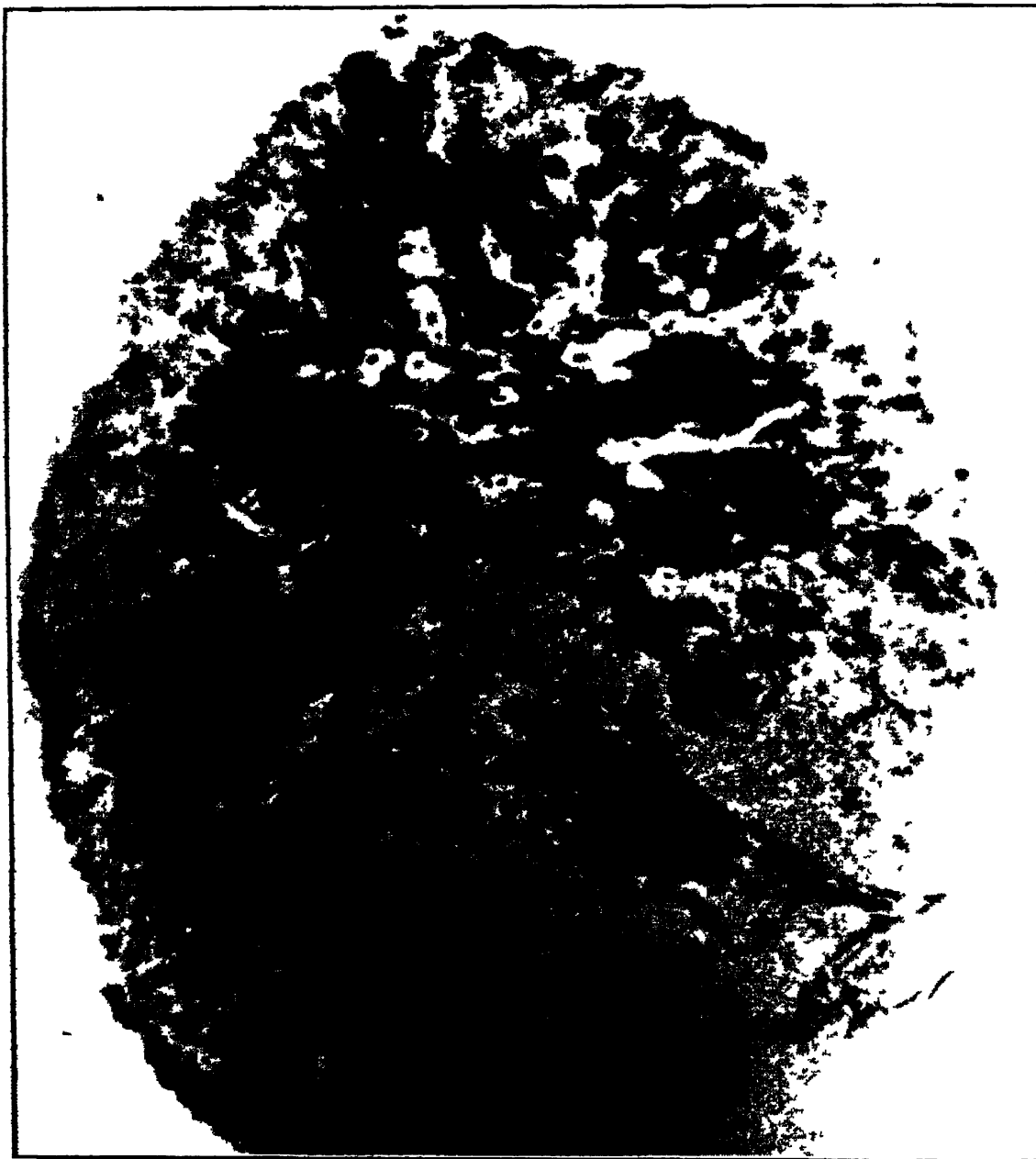


Fig 3—Macroscopic appearances in a very advanced degree of silicosis of infective type (tuberculo-silicosis). The greater portion of the lung is occupied by a massive infective fibrosis in which, however, the outlines of the original component nodules can be discerned. There is very marked marginal emphysema. Active tuberculosis was present in a similar massive area in the other lung. The heart weighed 300 grams (Simson, Strachan and Irvine Proc Transvaal Mine Med. Officers' Assoc, 1931)

cotic lung may be discussed in terms of tuberculosis, which is immensely the most important complication of silicosis. Tuberculous infection may arise

It may occur before, simultaneously with, or after, the development of silicotic nodulation. These 3 contingencies will be briefly considered

It is well known that infective processes within the lung attract "dust cells," and if the "dust cells" contain silica, a modification of the course of the infection in the direction of organization and

persistent foci of a previously existing tuberculous infection

Or, again, tubercle bacilli may be inhaled simultaneously with silica particles. It is suggested that in this case,

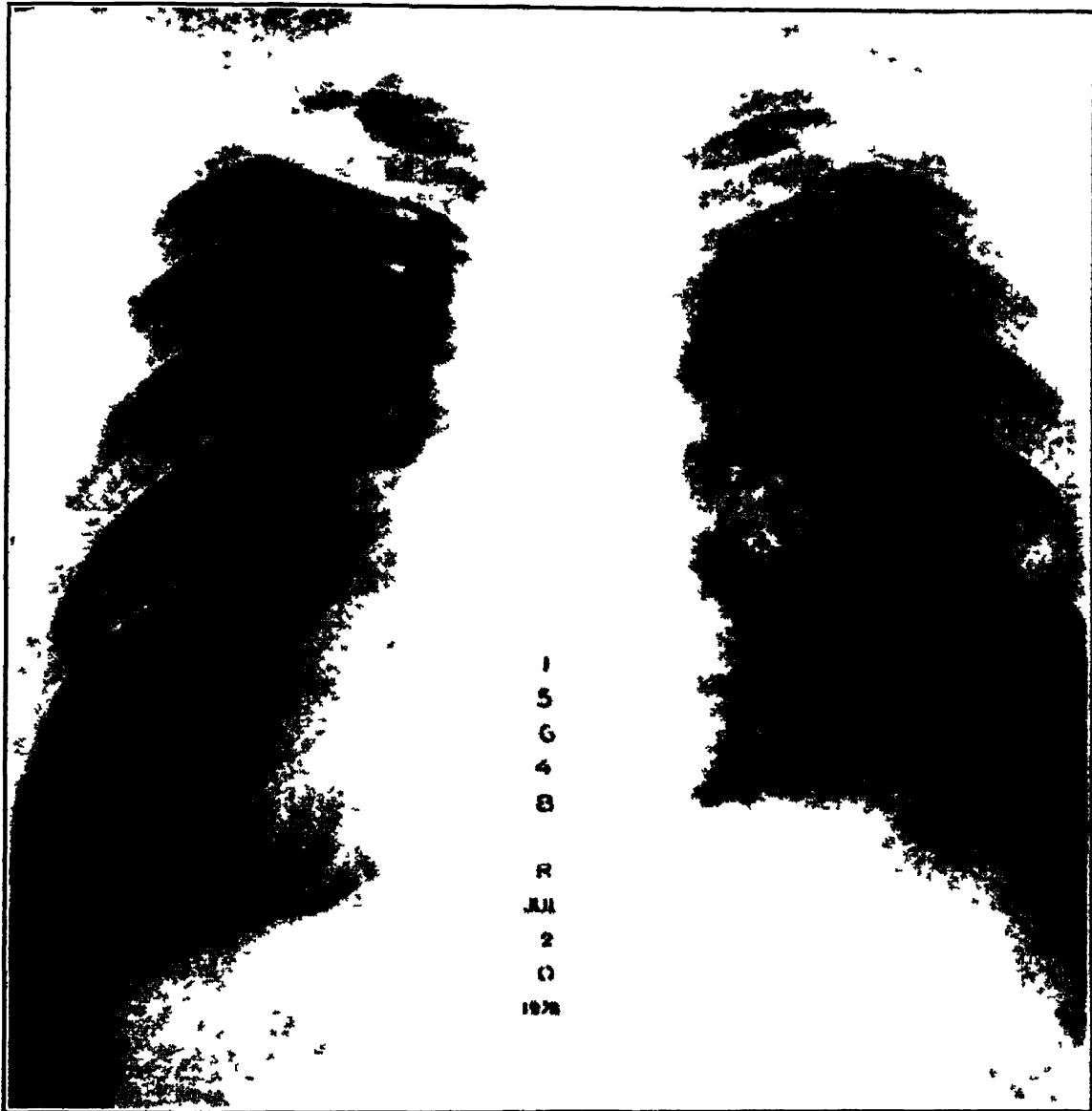


Fig 4—Generalized small motting. Indicative of a moderate degree of silicosis of simple type. Both lung fields are occupied by numerous small discrete rounded shadows, producing the characteristic motting. (Simson, Strachan and Irvine. Proc Transvaal Mine Med Officers' Assoc, 1931.)

fibrosis may result, and such fibrosis may have a recognizable silicotic character. It is not uncommon to find in the lungs of miners, which may otherwise show no evidence of silicosis, that localized areas of dense pigmented fibrosis have developed around isolated

if the dose of bacilli is small, both bacilli and dust are taken up by phagocytic cells, and are carried to the minute masses of lymphoid tissue. The result of the mutual reaction of the 2 factors of dust and infection is to produce a nodulation of the "infective" type

Finally, where a condition of simple silicosis is already present, infection may take place from a previously latent focus elsewhere in the body or by a fresh infection from without. This

The isolated "infective" islet develops in the same situations as the simple "noninfective" islet. In the early stages it consists of a mass of very cellular fibrosis lying within an aggregation of

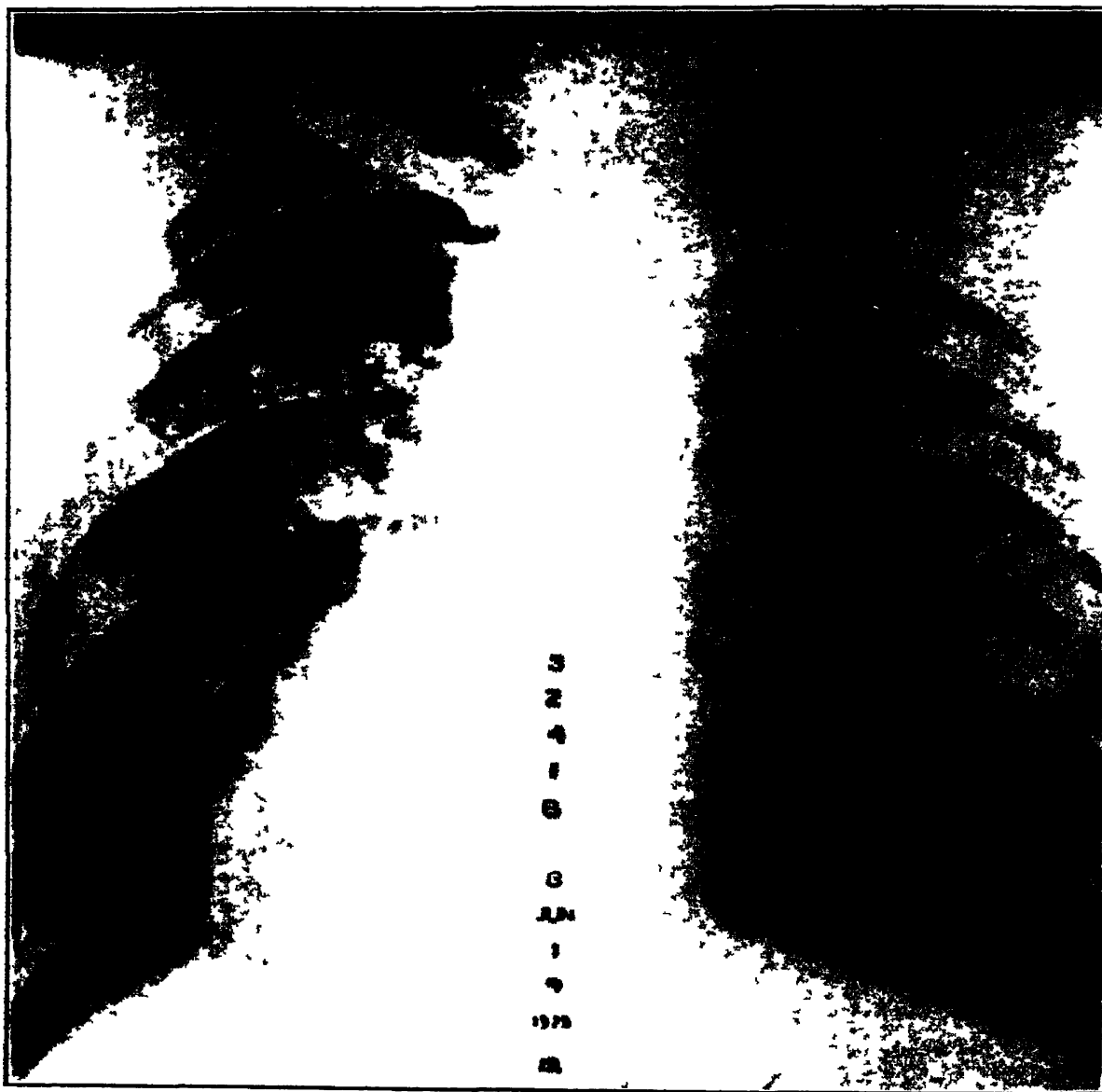


Fig. 5—Generalized medium mottling, partly infective in type. Indicative of a well-marked degree of silicosis of infective type. Note the irregularity in size and distribution of the discrete shadows and the localized opacity towards the right apex. This case ultimately developed an active tuberculosis. (Simson, Strachan and Irvine. Proc. Transvaal Mine Med Officers' Assoc., 1931.)

conjunction usually produces a different sequel.

Like the lesions of simple silicosis, those of infective type are found in the form of isolated islets or as a "massive fibrosis."

dust cells. The fibrosis closely simulates granulation tissue, but frequently blood-vessels are not observed. Some collagen fibers are laid down, but usually before an appreciable degree of dense fibrosis occurs necrotic degeneration of

varying degree takes place in the center of the islet, and this change becomes more marked as the condition advances. The tuberculo-silicotic islet attains larger dimensions than islets of noninfective type, and usually develops more rapidly. Evidence of inflammatory change is commonly seen also in the surrounding lung tissue in the form of increased vascularity, localized edema, cellular infiltration, catarrhal change, and, later, true inflammatory fibrosis. If this reaction is extensive, it results in the production of an area of "infective massive fibrosis." Similar changes occur in root glands.

The "massive fibrosis" of tuberculo-silicotic type differs from that of the noninfective type previously described, in that the central portions of the nodules tend to show necrosis, the fibrous tissue growth is exuberant, and the islets are matted together by an inflammatory fibrosis. In progressive cases, these lesions tend to spread more or less slowly and large areas of the lung may be occupied by this type of "infective" fibrosis. On the other hand, the excessive fibrotic reaction may become the preponderant factor, with the result that such lesions, whether "nodular" or "massive," may show long periods of practical arrest.

In lesions of this type there may be no definite histological evidence of tuberculosis beyond the suggestive indication of necrotic degeneration of the central portions of the islets. Nevertheless, a series of biologic tests with material from lesions in the lungs and in root glands having the characters described have, in a majority of instances, produced tuberculosis in the inoculated animals.

In other instances, which appear frequently at least to result not from an

outward spread of infection from the nodule, but from the superimposition of tuberculous infection, probably by way of the blood stream, upon a fully formed silicotic nodulation, evidence of infection appears in the "dust cell" area at the periphery of the nodule. This applies both to isolated islets and to those which form part of an area of massive fibrosis. Histological sections reveal tuberculous granulation tissue within the "dust cell" area and in limited parts of the surrounding lung tissue. In more advanced cases there may be marked caseation, and the picture may then show fibrotic islets embedded in areas of caseous tuberculosis. In some instances there may be little or no modification of the infective process, in others, the caseous change becomes, in turn, limited by fibrosis.

The lesions described illustrate certain distinctive results of the reaction to tuberculous infection in the silicotic lung, they are neither purely silicotic nor purely tuberculous, and justify the employment of the descriptive term "tuberculo-silicosis." This term is not applied to the conjunction of silicosis with an unmodified tuberculosis in the lung where the tuberculosis occurs apart from the silicosis.

LUPUS ERYTHEMATOSUS.—

A case of acute disseminated lupus erythematosus is reported by F. D. Weidman and R. L. Gilman (*Brit J Dermat* 43: 641 (Dec) 1931), which on postmortem disclosed acute endocarditis but not tuberculosis.

They conclude that: (a) the dermatological changes known as acute disseminated lupus erythematosus can occur in connection with acute infectious processes, and, reasonably, quite apart from a tuberculous factor. (b) This

does not mean that the tubercle bacillus is incapable of provoking the same cutaneous expressions (c) It is regrettable that the term "lupus" was ever linked with this affection, since it connotes a tuberculous etiology (d) They believe that acute disseminated lupus erythematosus, pathologically speaking is, in many cases at least, of the order of a chronic erythema multiforme

J Schaumann and P Introzzi (*Haematologica* 1 Arch 12 635, 1931) describe 4 cases of *acute* lupus erythematosus In the 3 cases in which a necropsy was performed they found lesions in the lymph nodes, the tonsils, the spleen and the bone-marrow In the fourth case, the epitrochlear lymph node, the only lymphatic organ that

could be examined, was likewise affected by the tuberculous process They conclude that acute lupus erythematosus is not an exclusively cutaneous process, but must be regarded as a manifestation of a generalized disease of a tuberculous nature, which may reveal itself by the presence of a nonacid resistant bacillus in the blood (no doubt a form of tubercle bacillus) There are localizations of the bacillus in the hemopoietic apparatus, which, if not always macroscopic, are at least microscopic These localizations present sometimes the form of ordinary tuberculosis and sometimes the form of a granulomatous, nonfollicular tissue, which may resemble the tissue of malignant granulomatosis

M

MALNUTRITION IN CHILDREN.—METABOLISM.—The *cholesterol content of the blood* of malnourished infants has not been studied as extensively as other factors and, therefore, the report of P Nobécourt, A. Comminos and P Ducas (*Arch de méd d enf* 35 249 (May) 1932) on this subject is of interest There was a lack of uniformity in the results which they obtained Of 4 underweight infants who also had active rachitic lesions, 1 had a normal cholesterol content in his blood, the second had a large amount, the third had a normal amount on one examination and an increased amount 15 days later, the fourth infant had a normal blood cholesterol content on 2 examinations In a group of infants who were undernourished because of chronic infections, the cholesterol was elevated in 3 instances, normal in 2, and slightly decreased in 2 In a third group

of infants who had both rickets and a chronic infection, the cholesterol was high in 2 cases and low in 3 others It was concluded that the variations of cholesterol in the blood of these undernourished infants did not differ materially from those of other children The variations in this series of patients were slight, ranging from 0.9 Gm per 100 c c in the lowest estimations, to 1.9 Gm per 1000 c c in the highest There seemed to be no relationship between the degree of cholesterolemia and the refraction index of the blood serum The latter values depended generally upon the extent of dehydration of the infant

ETIOLOGY.—Many factors contribute to the etiology of malnutrition in infants and children During the last few years there has been a tendency to emphasize the quality rather than the quantity of the diets of these patients, and attention has been directed to the

vitamines especially. The economic depression of the last year or two has not yet produced any clinical evidence of an increased incidence of malnutrition among children, but if their diets become reduced in amounts and are inadequate in their vitamine content, there may develop severe impairment of growth, nutrition and health together with a higher incidence of the deficiency diseases, such as rickets and scurvy, and an increased susceptibility to infection.

Avitaminosis — Vitamine A — The subject of vitamine A and the results of its deficiency in the diet has been thoroughly reviewed from a clinical aspect by G. B. Eusterman and D. L. Wilbur (J. A. M. A. 98:2054 (June 11) 1932). The vitamine apparently occurs in the yellow plant pigment carotene and passes into the intestinal tract in an unchanged form, to be transformed by and stored in the liver. The vitamine occurs in high concentrations in milk, butter, eggs, green vegetables, and in animal fats, notably cod- and halibut-liver oils. Smaller amounts are present in carrots, tomatoes, pumpkins, sweet potatoes and dried green peas. The vegetable oils, cereals and muscle tissue are relatively poor in vitamine A. Marked deficiency of the vitamine is known to produce xerophthalmia, which is a very rare condition in human patients. Night blindness has also been attributed to a deficiency of this vitamine in the diet.

There may be a moderate reduction of vitamine A in the body, due to a diminished intake, a failure of absorption, or to a marked increase in demand of the body brought about by rapid growth or by the influence of disease. Slight deficiencies may result in numerous disturbances of nutrition. Among those reported by different investigators

are an increased susceptibility to respiratory infections, noticed in animal experiments and in clinical observations, diseases of the intestinal tract, a high incidence of urinary calculi, pyelitis, changes in the uterine epithelium, changes in the moisture and pigmentation of the skin, infections of the skin, secondary anemia, degenerative nerve lesions and numerous septic conditions.

Needless to say, it was the author's opinion that these observations required confirmation. The average individual obtains a sufficient amount of vitamine A in his diet and there is no evidence that the absorption of this substance is diminished by disease. However, the amount of this vitamine may be readily increased by the addition of any of the above foods or cod-liver oil to the diet.

A clinical investigation of the effect of various amounts of vitamine A in the diets of different groups of children was made by L. H. Barenberg and J. M. Lewis (J. A. M. A. 98:199 (Jan 16) 1932). One group of 19 infants received partly skimmed milk, another group of 94 infants received pasteurized milk and 20 drops of viosterol, the third group of 85 infants were given pasteurized milk and 3 teaspoonfuls of cod-liver oil, while a fourth group of 6 infants received pasteurized milk and 6 teaspoonfuls of cod-liver oil. Other foods such as butter, and vegetables were added to the diets of these infants when they reached the age of 8 months. The 4 groups thus received various amounts of vitamine A. Of the infants less than 6 months of age, the first group had about 750 units; the second had 1500, the third, 9000, and the fourth, 16,500. The infants over the age of 6 months received larger amounts of vitamine A but the differences in units were about the same be-

tween the 4 groups. The respiratory diseases of these patients were recorded over a period of 4 months to a year and there seemed to be no differences in the incidence or in the severity of these infections among the 4 groups.

Vitamine B—Within the last few years, a great deal of emphasis has been placed on vitamine B as an important factor in the proper nutrition of children. Vitamine B, as it was originally described, has been divided into 2 distinct vitamins, one of which contains antineuritic factors and the other an antipellagra substance. The latter has been designated as vitamine B₂ or G. In a study made by P. Summerfeldt (Am J Dis Child 43:284 (Feb) 1932), a series of 21 children between the ages of 6 and 13 years who were patients in a preventorium were given diets high in vitamine B. The source of vitamine in this instance was a cereal composed of farina (53 per cent), oatmeal (18 per cent), corn meal (10 per cent), wheat germ (15 per cent), bone meal (2 per cent), brewer's yeast (1 per cent), and alfalfa leaf (1 per cent). This mixture contained also vitamins B₂ and E, together with adequate copper, iron, calcium and phosphorus. Four ounces (120 Gm) a day were given to one-half the group for a period of 10 weeks and the rate of gain in weight was 3.57 times the expected rate, while the other group gained at a rate of 1.7 times the expected. After the 10 weeks the groups were reversed and the previous control group which now received the special cereal mixture gained at a rate 4.84 times the expected rate, and the others gained at just the expected rate. The hemoglobin, as measured in values of grams per 100 c.c., increased after the administration of this food, probably due in part to the

high iron and copper intake. The question was raised whether the average diets of children contained adequate amounts of vitamine B, to promote the best possible rate of growth.

In a review of the subject of vitamine B₁, G. R. Cowgill (J A M A 98:2282 (June 25) 1932) mentioned the diseases which were caused by inadequate amounts of this substance in the diet. Extreme deficiency which leads to *beriberi* is common in the Orient but relatively rare in the United States, except in an occasional immigrant from the Orient. An instance of beriberi in an infant which has been reported in this country was traced to a deficiency of vitamine B in the diet of the mother. Occasionally, *lesions* of the *central nervous system* and *polyneuritis* have been attributed to a severe deficiency of this vitamine. There have been numerous instances in which a moderate shortage of vitamine B has resulted in a *disturbance of metabolism*. *Anorexia*, due primarily to a lack of desire to eat, has been demonstrated experimentally in animals which have received insufficient amounts of vitamine B. Similar symptoms have been observed in malnourished infants. In this connection, *anhydremia*, *faulty digestion* and *increased metabolic rates* have also been observed by various clinicians. The vitamine has been thought to exercise some influence on *growth* and numerous experiments with varying amounts of vitamine B in the diets have confirmed this opinion. The foods which are rich in this vitamine are yeast and wheat germ, but tomatoes, raw cabbage, fresh spinach, legumes and egg yolk also contain fairly large amounts, while orange and lemon juice, onions, lettuce, cauliflower and milk contain smaller quantities. In addition, any one of numerous proprietary substances,

of course, may be used as a source of the vitamin

Vitamine B₂—Vitamin B₂, or G, is the more heat-stable factor of the original vitamin B, and is necessary for the *prevention of pellagra*. In the review of this subject by B. Sure (J. A. M. A. 99:26 (July 2) 1932), it was stated that vitamin B₂ had not yet been isolated in pure form, but there was considerable evidence that it was a neutral organic substance and not a nitrogenous base such as vitamin B₁. Foods containing large amounts of vitamin B₂ are dried ox liver, dried yeast, meat (dried steak), milk solids, dried egg yolk, wheat, corn and peas. The acute deficiencies of this vitamin in human diets result in pellagra, but slightly inadequate amounts in the body may lead to several other disturbances. It is frequently difficult to differentiate the effects produced by deficiency of vitamin B₁ from those of B₂, but an inadequacy of the latter vitamin has been noted to result in *anorexia*, a *diminished lactation function*, skin lesions such as *hyperkeratosis* and *ulceration*, *congestion of the intestinal tract* and *inflammatory changes in the lids and cornea*. There has been considerable evidence accumulated in the author's laboratory that vitamin B₂ is a complex material, part of which seems to be related to prevention of pellagra symptoms and part related to growth.

Vitamine C—Recent advances in the knowledge of *scurvy* and vitamin C have been reviewed by A. F. Hess (J. A. M. A. 98:1429 (Apr. 23) 1932). According to this writer, the incidence of scurvy during the late war increased in both the adult and infant population, and in recent years it has been reported to be rather prevalent in Leningrad. In the United States the incidence of

scurvy is low, but it is questionable what effect the economic depression will have on the increase in the number of such cases. Pathologic changes which occur in the teeth of animals who were given diets free from vitamin C have been described as a fibrosis and fibroid degeneration of the pulp. Histologically, osteoblasts were found to replace the odontoblasts which resulted in the formation of bone rather than dentin. Other investigators have reported defects in the capillary epithelium, impairment of the formation of connective tissue and degeneration processes in the anterior horn cells of the spinal cord and in the peripheral nerves.

In regard to early *symptoms of vitamin C deficiency*, numerous clinicians have noted an increased susceptibility to infections, both in human patients and in experimental animals. Nervous symptoms such as pain, hyperalgesia, patchy anesthesia, variations in the intensity of knee jerks have also been described in patients who have received inadequate amounts of vitamin C.

Experiments made by the author and others have demonstrated that this vitamin is not destroyed by heat so much as by oxidation. Application of this knowledge has made it possible now to can foods without much loss of vitamin C. The amount of this substance in raw milk depends upon the vitamin C content of the cow's diet. Ordinary raw milk contains a moderate amount of this vitamin and about one-third to one-fourth of it is lost by pasteurization. When a food is heated in the presence of certain metals, such as copper, the vitamin is rapidly destroyed. Recent attempts to isolate the active principle from orange juice resulted in the extraction with ether of a substance with the chemical composition of narcotine

This material alone was inactive in preventing scurvy, but irradiation of it developed antiscorbutic properties. Similar chemical compounds which have been synthesized by O Rygh, A Rygh and P Laland (Ztschr f physiol. Chem 204 105, 112, 114, 1932) have proved to be antiscorbutic

Previous investigations of A Hess and others indicated that scurvy was not always due to a deficiency of intake of vitamine C in the diet, but probably a disturbance of absorption in the intestinal tract, due to the influence of certain bacterial toxins

Vitamine D—Vitamine D is contained in certain sterols and its potency may be stimulated by subjecting it to the action of ultraviolet irradiation. The relationship of this vitamine to the nutrition of infants and children has been reviewed from the clinical aspect by F W Schlutz (J A M A 99·384 (July 30) 1932). Rickets may be either the result of (1) a lowered dietary intake of calcium and phosphorus, or (2) a failure of absorption, or (3) the inability to utilize them properly in the formation of bone. Vitamine D apparently furnishes the stimulus to this last phase of metabolism. In addition to the proper growth of bone, vitamine D exerts a favorable influence in combating the other diseases related to calcium and phosphorus metabolism such as tetany, osteogenesis imperfecta, celiac disease. The therapeutic effect of vitamine D in the last two diseases is not so striking as in rickets or tetany. There is considerable evidence that vitamine D is beneficial in promoting good nutrition and in resisting infections. Its value in stimulating the proper formation of teeth, especially of the secondary set and the prevention of caries has been claimed by several investigators.

It has become more and more evident that the *pregnant mother* requires vitamine D for the proper metabolism and nutrition of herself and the fetus. It is also necessary for her to have a sufficient amount of the vitamine during lactation in order that she may supply the proper amounts of calcium and phosphorus in the milk without damage to her own tissues. It has also been shown that small amounts of the vitamine are secreted in the milk. In addition, it is, of course, necessary that the rapidly growing infant should receive its supply of vitamine from additional sources. Vitamine D occurs in large amounts in the livers of cod, halibut, salmon and other fish. It is also plentiful in egg yolk, providing the chickens have had the proper diet and exposure to sunshine. In addition to these sources, it is possible to irradiate, with ultraviolet light, many of the plant or animal sterols, notably ergosterol and produce a high vitamine D content. The benefits derived from the irradiation of the patient possibly depend upon the activation of cholesterol, although this is not proved as yet. (The subject of vitamine D milk is discussed in the section on Infant Feeding.)

Overdosage of cod-liver oil and viosterol have produced harmful results in experimental animals but the amounts used have been tremendous. No such results have ever been observed in human patients. It was the author's opinion that 20 to 30 drops of viosterol may be used for curative effects in prematures and small infants. Higher doses have been used without harm.

The action of vitamine D in the *prevention of infections* in rats was investigated by E C Robertson and J R Ross (J Pediat 1 69 (July) 1932). Two groups of rats were given diets contain-

ing all the vitamins except D, and 2 groups received, in addition, an amount of vitamin D equal to 3.5 Steenbock units per 100 Gm. The degree of rickets was estimated by inorganic phosphorus determinations of the blood serum, the percentage of ash in the leg bones and by x-ray examination. Cultures of *Salmonella muritidis* ("rat typhoid") were fed to the animals and observed for 28 days. The rats which had received the vitamin D resisted the infections much better than did the other animals. This would seem to indicate that vitamin D is likewise concerned in the resistance of infections by human patients.

J. Kirsch and S. Rosenbaum (Monat f. Kinderh. 52:177 (Mar. 17) 1932) noted the effect of rickets on development and caries of the teeth. In a group of 20 infants who had no clinical evidence of rickets, there was observed later in life about the same amount of caries of the deciduous teeth as in children who had had rickets. The group of infants who had had severe or mild forms of rickets in infancy developed deformities of the jaw in later life and they also had caries of the secondary teeth much more frequently than the children who were free from rickets in infancy.

Vitamin E—One of the newest additions to the growing list of vitamins is *vitamin E*. During the observation of the physiology of *reproduction* in experimental animals, certain disturbances of function were noted in rats which were supposedly fed diets complete in all the vitamins. The subject was reviewed by one of the original investigators, H. McL. Evans (J. A. M. A. 99:469 (Aug. 6) 1932). The effect of deficiency of this vitamin in the male was a degeneration of the seminiferous

cells and in the pregnant female by disturbances in the developing embryo. Deficiencies of vitamins A and B may also lead to impaired reproductive function. Inadequate amounts of vitamin A lead to a testicular degeneration but healing occurs more readily in this instance than in the case of the damage done by vitamin E deficiency. Deficiencies of vitamin B₁ have led to repression of reproductivity, but there was no selective pathologic damage to the generative system noted.

Other effects of inadequate vitamin E have appeared in the form of *nervous symptoms, paralysis, impaired lactation, malnutrition* and *muscular atrophy*. Vitamin E occurs abundantly in leafy green vegetables such as lettuce, spinach, alfalfa and water cress, and in seeds, especially in the fat portions of the wheat germ. In the animal body it is present in small quantities in muscle tissue and fat but not in the liver, kidney or gonads.

MEASLES.—PATHOLOGY.—

Although the etiology of measles is not known, it is possible to transmit the disease to susceptible individuals or animals with injections of blood taken from a patient during the first few days of his measles infection. There is also some indication that the virus of measles is present in the skin eruption, according to the studies of C. Magarinos Torres and J. de Castro Teixeira (Compt. rend. Soc. de biol. 109:136 (Jan. 22) 1932). Epidermis which was lightly scraped from skin of a measles patient, 12 hours after the appearance of the eruption, was ground in a mortar, emulsified and injected into a monkey (*m. rhesus*). The symptoms of this animal resembled those of a monkey injected with blood taken from a measles

patient within the first 4 days of the illness

COMPLICATIONS.—The occurrence of *encephalomyelitis* as a complication of measles has been reported frequently within the last year and the number of patients who developed such lesions has apparently increased during the last decade

Transverse myelitis occurred in a patient observed by F G Miller and A G Ross (Canad M A J 25 709 (Dec) 1931) Pain in the lumbar region began on the third day of the illness and was followed by weakness in the legs and arms, and incontinence of urine and feces Improvement began 2 weeks later and by the end of 2 years the patient had recovered completely except for slight abnormality of his gait

Different manifestations of this complication were obtained by P Heath (Am J Ophth 15 130 (Feb) 1932) On the eleventh day of an attack of measles, a patient, 6 years old, developed a loss of sight, lethargy and intervals of excitement Ultimately the vision returned, but the patient continued to have abnormalities of behavior

Histologic studies of the brains of patients with postmeasles *encephalitis* have usually shown a characteristic perivascular proliferation of the glial tissue, and a perivascular demyelination and disintegration of the axis cylinders, according to A Ferraro and I H Scheffer (Arch Neurol and Psychiat 27. 1209 (May) 1932) However, they reported 2 instances of this same disease in which there were none of the above lesions but, instead, a more pronounced involvement of the gray matter. The nerve cells were atypical in appearance and had evidence of edema and occasionally degeneration.

The authors attributed the difference

of the lesions to a variation of the strength of the substance acting on the brain If this substance is mild in nature, only a perivascular response with microglial proliferation occurs, but if this agent is powerful, the nerve cells become involved primarily and undergo degenerative changes

Searching for another explanation of the occurrence of postmeasles *encephalitis* in certain children, some clinicians have suggested an hereditary influence or a preceding brain injury as a predisposing factor L van Bogaert, Borremans and Couvreur (Presse méd 40 141 (Jan 27) 1932) have observed 3 children with encephalitis following measles, all of whom had some predisposition to neurologic or intracranial involvement The first child had had a traumatic injury of his skull during infancy but had apparently recovered and his subsequent physical and mental development was normal At the age of 5 years, he contracted an exanthematous disease which was probably scarlet fever and this was followed by some neurologic and mental changes Four months later he developed measles and died of a complicating encephalitis, with symptoms of confusion and coma, and evidence of a lesion of the cerebellum and the pyramidal tracts

In the second child, 3 years of age, the onset of measles was followed in 6 days by pain in the lower extremities Eighteen days after these preliminary nervous symptoms, there was an exacerbation of the complication with high fever, headache and vomiting, a slight facial paralysis and a positive Babinski reaction

The third child, 4 years of age, developed a fatal encephalitis with delirium, convulsions and collapse 4 days after the onset of measles At autopsy,

the brain showed a diffuse encephalitis with capillary hemorrhages

The authors suggested the possibility of a lowering of the hematoencephalic barrier by a preceding predisposition or trauma, together with an insufficient defense mechanism elsewhere (*e.g.* the skin) which allows toxin to penetrate into the brain. This explanation rather than one based on an unrecognized virus or reactivation of a latent virus seemed more plausible in explaining the complication.

An unusual complication was noted in a patient with eczema who contracted measles. J. R. Paso (Semana med. 1:134 (Jan. 14) 1932) stated that the rash of measles in this instance was characterized by vesicles which later formed areas of *gangrene*. A *staphylococcus aureus* was recovered from the local skin lesions and from the blood stream. Recovery was complete.

TREATMENT.—Although the most effective method of conferring passive immunity, or of treating measles is the use of **convalescent serum**, the source of this material is necessarily limited. Blood taken from adults who have had the disease previously is as effective if larger doses of it are employed. A convenient source of adult immune serum is placental blood taken from the umbilical cord during the puerperium, according to the report of G. S. Finkelstein (Vrach. Delo 14:794 (Aug. 31) 1931). This serum was treated with 5 per cent phenol, heated to 56° C. for about 1 hour and specimens were pooled. Administered in doses of 40 to 60 c.c., it seemed to be as effective as convalescent serum in protecting children from measles and reducing the mortality rate of that disease.

If convalescent serum or immune adult serum is administered at the

proper time during the incubation period of measles it is possible to decrease the severity of the attack of that disease and yet insure a lasting immunity. R. Debre (Arch. f. Kinderh. 95:169 (Feb. 5) 1932) stated that a minimum of measles infection is necessary in order to produce a lasting immunity against the disease. If **convalescent serum** is used to protect the patient against a severe infection, no permanent immunity occurs unless the patient develops a definite rash and catarrhal symptoms. He mentioned an example of a patient who received the serum fairly early in the incubation period and subsequently developed mild catarrhal symptoms, but only a few spots on the skin which lasted 24 to 28 hours. A year later, the child was exposed again and contracted measles, though only a mild infection. Another patient who was treated with serum on the sixth day after exposure, developed a rash over his entire body, a slight photophobia and a fever which lasted 2 or 3 days. His sister had received a larger dose of the serum, sufficient to confer complete passive immunity. A year later, both were exposed to the disease again and the boy escaped infection, while the girl contracted the disease.

MENINGITIS.—F. Fremont Smith (Arch. Neurol. and Psychiat. 28:778 (Oct.) 1932) has written an account of the pathogenesis of the changes in the cerebrospinal fluid in meningitis. He limits the term "meningitis" to include only the acute purulent and chronic meningitides in which organisms may be found—essentially an empyema of the ventriculo-subarachnoid space. This meningitis is characterized by:

1. Increased cerebrospinal fluid pressure. The factors causing this are

chiefly dilatation of the intracranial blood-vessels, with consequent increased fluid transudation and mechanical obstruction of the cerebrospinal fluid pathways by the inflammatory products with consequent decreased absorption of fluid. Other less important influences are edema of the brain and a decrease in the osmotic pressure of the blood and increase in that of the cerebrospinal fluid.

2 Increased cells and protein and decreased sugar and chlorides. These changes are an expression of the "law of meningitis" as formulated by Cohen, by which the cerebrospinal fluid constituents tend to remain in osmotic equilibrium with those of the blood plasma but alter their relative proportions in consequence of the increased permeability of the membranes separating these fluids—the Donnan equilibrium effect. The increased membrane permeability accounts for the increase in inorganic phosphorus, protein, uric acid, immunological substances and the slight decrease in magnesium. Moreover, the decrease in chlorides is partly due to this factor, but more so to the fall in plasma chlorides, a usual accompaniment of febrile diseases. The local breakdown of dextrose by bacterial and cellular activity offsets the above tendency, despite the usual tendency of the plasma sugar to rise in fevers, and causes a fall in cerebrospinal fluid glucose with increased lactic acid formation and consequent acidity.

From his histologic studies in meningitis, B. Hassin (Arch Neurol and Psychiat 28 789 (Oct) 1932) is led to broaden the term "meningitis" to include all "reactive histologic phenomena in the cerebral meninges against an infection or an intoxication." This includes the noninfectious or aseptic and

experimental types, as well as the infectious and purulent meningitides, all of which are characterized by the reaction of the various hematogenous and histogenic cells normally present in the meninges and the subarachnoid spaces. Since the cerebral tissue and perivascular spaces form one continuous system with the subarachnoid space, it follows that a lesion of one portion affects somewhat the rest.

D. W. Kramer and B. B. Stein (Arch Int Med 48 576 (Sept) 1931) described a case of *tuberculous meningitis* with *syphilitic meningitis* terminating in recovery. The patient showed meningeal signs as Kernig, Brudzinski, etc., Argyll-Robertson pupils, strabismus and optic neuritis. The cerebrospinal fluid contained 1200 cells, 44 per cent of which were lymphocytes, a tabetic colloidal gold curve and a 4+ Wassermann reaction. Under treatment with iodides and mercury, a clear spinal fluid was obtained in 10 days with a pellicle in which tubercle bacilli were found. The guinea-pig inoculation test was negative, although the animal died in 3 months. They suggest the possibility that the iodides may have broken down a tuberculous focus and the tubercle bacilli subsequently localized in the syphilitic meningeal tissue—a *resistentia minoris*. The authors found reports of over 400 cases of tuberculous meningitis with recovery in the literature and believe the prevailing hopeless prognosis unjustified.

OTITIC MENINGITIS.—Treatment.—According to Alain Gaston (Rev d'oto-neuro-opht 9:397 (June) 1931), the *preventive treatment* consists in the radical exenteration of the mastoid process in chronic otitis. A labyrinthitis that lasts more than 8 days, with increasing lymphocytosis in the

spinal fluid, requires drainage of the labyrinth

Every meningeal reaction demands intervention removal of the auricular focus, drainage of the subarachnoid spaces and antibacterial remedies. The observations at operation will determine the procedure mastoidectomy, sinus opening, evacuation of extradural or brain abscesses, and drainage of the labyrinth if the meningitis follows a labyrinthitis. In cases of *hypertensive meningeal reaction* without localizing signs, repeated lumbar and cisternal punctures suffice, but large quantities of fluid must be withdrawn. If localizing signs are present, temporal or suboccipital decompression must be added if the hypertension persists. If signs of localization and hypertension still persist, the encysted fluid should be removed, the point of election being revealed by the localizing signs. Ventricular puncture is indicated in *hydrops of the ventricle*. In *diffuse purulent meningitis*, the gravity of the case warrants the successive carrying out, in the minimum of time, of all measures for drainage of the pontocerebellar lake, translabyrinthine drainage and ventricular and spinal punctures. But, when recovery occurs in a case of septic meningeal reaction, spinal drainage suffices in most cases.

MENOPAUSE.—PATHOLOGY.

G FitzGibbon (Brit M J 1:924 (May 21) 1932) enumerates the causes of pathologic states of the uterus at the time of the menopause as follows. (1) ascending infection promoted by stagnation of menstrual or other discharges from the uterus and cervix; (2) laceration and damage during childbirth of the cervix and parametric tissues, exposing those tissues to chronic infection;

(3) septic infection following childbirth, (4) gonococcal infection on which secondary infection has supervened—far less common than the preceding and (5) growth and influence of neoplasms, chiefly uterine fibroids. The pathologic lesions that are produced and influence the course of the menopause are (1) chronic hyperplasia of the body of the uterus, (2) chronic metritis with chronic cervicitis, and (3) chronic cervicitis, with or without parametric induration. Associated with these conditions there is an increased vascularity, the smaller arteries are hypertrophied, and there is venous congestion. During the active child-bearing period of life, these lesions produce varying degrees of leukorrhea, calling for palliative treatment, such as routine douching, applications of caustics, and curettages. These treatments have no more curative effect on the chronic infection than gargles in chronic tonsillitis. Amputations of the cervix effect cures when the portio vaginalis is the part involved, but they frequently stop far short of removing the main center of infection, which is the supravaginal portion. When the period of the menopause is reached, and atrophy of tissue has proceeded, the vitality of the tissues is reduced, and the production of toxins from the chronic infection is increased. The local condition, leukorrhea, has been accepted as inevitable, while increased menstrual loss reduces the woman's resistance but is considered a necessary part of the menopause.

The author in no sense advocates hysterectomy as a universal treatment for ill health at the time of the menopause. The *differential diagnosis* of the lesions described is a difficult and minute matter. It is seldom possible to make an early decision. In the majority of

instances a decision will be reached only after a period of observation, but the lesions which exist at the onset of the menopause can be observed and should be sufficient to indicate treatment by hysterectomy if the ill health increases. Serious and permanent damage may thus be prevented. When hysterectomy is resorted to, it must be of the total type. The failure to observe the benefits of hysterectomy in these cases has in the past resulted from the common practice of performing the high partial operation, thus relieved the menstrual symptoms, but did not remove the toxic element.

COMPLICATIONS.—Insanity.—Attention is called by T. G. Moorhead (Brit. M. J. 1 923 (May 21) 1932) to the importance of examining every case of insanity occurring at the climacteric for possible septic infection. He reports a case of menopausal insanity that was apparently due to *focal sepsis*. For most of the time the patient was unable to speak, to stand or to walk. All her muscles were excessively flabby, she apparently did not recognize people. There was dribbling of saliva all the time, constant incontinence of urine and feces, and her expression was quite devoid of any intelligence. There was sobbing and crying sometimes nearly all day. She seemed quite hopeless. During 10 months, with the exception of a short period of distinct mental improvement, she became, from the psychological point of view, progressively worse. There was extreme depression, frequent fits of weeping, sometimes extreme restlessness, with shouting. The idea was suggested that a hysterectomy might possibly relieve the symptoms. A complete hysterectomy was performed, both ovaries being removed at the same time. The excised uterus was found to

be in a much more septic condition than had been imagined. From the physical point of view, the patient stood the operation well, and, apart from a mild heart attack 3 weeks later, probably caused by small emboli reaching the lungs, she made an uninterrupted recovery. The most striking result of the operation, however, is the fact that almost immediately after the operation her mental condition showed a most remarkable improvement. A week before the operation, an experienced alienist regarded her condition as one of hopeless presenile dementia. Three weeks after the operation, she was able to reply sensibly to simple questions. After a week, she began to notice her surroundings and to recognize her friends and relatives. In a fortnight there was evidence of returning memory. From that day there has been progressive improvement physically and mentally. Five months after the operation, the patient was able to go out for daily walks and drives, she eats well, sleeps well, and enjoys the visits and conversation of her friends. She writes short letters, can read the newspaper for a short period, and her face has recovered its old expression of intelligence.

TREATMENT.—Numerous reports have appeared dealing with the treatment of the various manifestations of the menopause from the hormonal aspect. S. H. Geist and F. Spielman (Am. J. Obst. and Gynec. 23 697 (May) 1932) treated 43 cases with amniotin. In 10 cases there was no improvement, while in 22 improvement varied. In summarizing the effect of amniotin in the treatment of the menopausal syndrome, they state that in one group of cases it seems to have influenced a return of the menstrual period with a temporary relief of symptoms, in other

cases it caused a distinct alleviation of symptoms while the substance was administered, but the relief was not of a permanent nature. In comparison with other therapeutic agents employed at their clinic, which has been in operation for 7 years, amniotin is distinctly superior.

Geist and Spielman (*Ibid* 23 701 (May) 1932) also summarize their results with theelin in the treatment of menopausal disturbances as follows.

1 Thirty-one cases, of which 25 were menopausal, were studied in order to determine the effect of theelin, a biologically potent female sex hormone preparation.

2 In 7 of the 25 menopausal cases definite improvement occurred. In 3 patients menstruation was reestablished, whereas the others were either unimproved or so slightly improved as to be negligible.

3 Two patients with *kraurosis*, on whom vulvectomy had previously been performed, showed marked improvement of the itching.

4 Three of 4 *amenorrhoeic* patients were unaffected as far as the return of menstruation was concerned. The fourth bled convincingly, probably attributable to the material used.

5 In several cases of natural *menopause*, bleeding, possibly menstruation, followed the injection of theelin.

6 The natural menopause seems to be more amenable to treatment than the artificial climax.

Regarding dosage, as much as 400 rat units per injection were given.

MENORRHAGIA.—ETIOLOGY.—Excessive bleeding is the menstrual disturbance most frequently associated with *hypothyroidism*, *amenorrhea*, rarely, if ever, occurring when the

thyroid gland alone is deficient in function. W. C. Waters, Jr. and G. A. Williams (*Am J Obst and Gynec* 23. 489 (Apr) 1932) report 6 cases of menorrhagia due to hypothyroidism and demonstrate the efficiency of thyroid substance in correcting the disorder. In patients of any age whose menorrhagia cannot be attributed to pelvic pathology, a therapeutic test with thyroid gland administration should be given before more radical measures are instituted. Definite hypothyroidism may occur in the presence of an apparently normal basal metabolism. The importance of the basal metabolic rate has been over-emphasized in the diagnosis of variation in thyroid gland activity; disturbance of metabolism should be accepted only as one evidence of disease. The response of symptoms of hypothyroidism, including menorrhagia, to substitution therapy furnishes the most reliable evidence that the thyroid gland is deficient in function.

MENSTRUATION.—MENSTRUAL DISORDERS.—*Etiology.*

—Profuse and irregular uterine bleeding in the *blood dyscrasias* is often an important occurrence and many times a symptom of outstanding diagnostic significance. M. E. Kahn (*J A. M. A* 99.1563 (Nov 5) 1932) reports 4 cases of abnormal uterine bleeding which was the first and most prominent symptom of a blood dyscrasia.

Additional examination of hospital records since 1925 revealed a group of 45 women with blood disease during the reproductive period of life. Abnormal menstrual flow was present in 23 (51.1 per cent), in 15 (33.3 per cent) menstrual bleeding was excessive, unduly prolonged, or too frequent; and in 7 (15.5 per cent) it was diminished or

infrequent Therefore, about one-half of this series showed some deviation of menstruation from the normal This menstrual irregularity figured prominently in the symptom complexes which brought these patients to their physicians

It is felt that in the past sufficient emphasis has not been placed on disturbance of the menstrual flow occurring in those cases in which no pelvic abnormality is demonstrable It is because of the absence of a pelvic lesion that often no importance is placed on the menstrual symptom In other cases, when the flow has been excessive, curettage has often been performed, but bleeding soon recurs It is in just such cases that a complete study of the blood will sometimes reveal an underlying blood disease as the etiologic factor, the menstrual disturbance being but a local manifestation of a systemic disorder

In those cases in which menstruation is diminished, delayed or absent, error in diagnosis is less apt to occur Here, the physician, suspecting that the scant irregular flow is the result of an anemia, will examine the patient's blood and often uncover the true nature of the disease It is in the other group of excessive or prolonged bleeding that blood disease is less commonly considered and mistakes in diagnosis are more frequently made

Treatment.—The object of **estrin** therapy in the treatment of amenorrhea, oligomenorrhea, and hypomenorrhea is to combat the uterine hypoplasia, almost invariably present in these conditions, by rendering the uterus responsive to whatever ovarian function there may still be present or to the renewed ovarian function resulting from treatment simultaneously directed to the ductless gland primarily responsible for

the existing menstrual disturbance The hormone, as pointed out by C Mazer and L Goldstein ("Clinical Endocrinology of the Female," W B Saunders Co, Philadelphia, 1932), is incapable of stimulating the ovaries themselves or the extragenital glands concerned with the menstrual function

The administration of female sex hormone (estrin) is valueless and probably harmful in the treatment of functional uterine bleeding

The oral administration of the hormone is clinically more effective because it can be administered at frequent intervals, and, consequently, with a minimum of loss through rapid excretion

The ratio between the hypodermic and oral dose is approximately 1 to 4 The size of the dose is directly proportional to the degree of uterine hypoplasia Usually the requirement is 1200 rat units administered daily by mouth for a period of 2 or 3 months If given hypodermically every day, 300 rat units are equivalent to the aforementioned oral dose

VICARIOUS MENSTRUATION.—Hemorrhages from the *breast* may be observed in hysterical women, in women with a predisposition to hemophilia, during the course of hemorrhagic purpura, during lactation, as supplemental menstruation (cases showing a diminished vaginal menstruation), as vicarious menstruation, or they may be caused by trauma of the breast or by fissures or sores of the nipples After all the conditions mentioned (especially trauma) have been ruled out, hemorrhage from the breast may have a diagnostic value in pointing out the presence of epithelioma of the breast in an early stage of development The patient should be watched carefully for a possible future development of the tumor,

even if during examination no tumor was detected on palpation. After all the conditions mentioned (hysteria, hemophilia, hemorrhagic purpura, lactation, trauma, fissures or sores of the breast) have been ruled out, but provided the patient has a diminished or suppressed menstruation, the presence of either supplemental or vicarious menstruation is obvious.

E B Ries (*Prensa med argent* 18 1602 (Apr 30) 1932) reports an interesting case of vicarious menstruation from the breast in a virgin, age 32, who up to the appearance of the mammary hemorrhages had not had symptoms indicating genital disturbances. While she was in apparently normal condition, menstruation disappeared and monthly hemorrhages from the breast followed.

The *prognosis* for the patients with vicarious menstruation is favorable. Spontaneous recovery takes place if the patient is given the proper treatment, which aims to restore the genital activity and normal menstruation. If the patient is at the menopausal age, recovery will take place as soon as the symptomatic hypertension is controlled.

Opoththerapy and **sportive exercises** give satisfactory results. In cases in which opoththerapy is not beneficial, it may be associated with the administration of **thermal or electrical therapy** (hot vaginal douches or intrauterine electrical applications) which aim to regulate the hyperemia of the uterus. In *grave cases* of vicarious hemorrhages, **scarification of the cervix** and the administration of **strong saline cathartics** are advisable. This treatment aims to produce a deviation of the blood toward the genital organs. Gynecologic operations are indicated when the menstrual disturbances are associated with

malformations of the vagina or of the uterus. **Surgical dilation of the cervix**, either with or without intubation (whichever is necessary) is indicated in cases in which the menstrual disturbances are associated with *cervical stenosis*. As the last resource in case of either *cervical stenosis* or *genital malformations*, **castration** is indicated, remembering that it is employed only after all other means fail. The author's patient received a combined treatment of **ovarian hormone** and **aloe preparations** and also a preparation of the **anterior lobe of the hypophysis**, and she was instructed to perform **sportive exercises**. Menstruation in this case returned to normality and the hemorrhage from the breast disappeared.

MENTAL DEFICIENCY.—INTELLIGENCE OF IMMIGRANTS.—Lawrence Kolb, Senior Surgeon U S Public Health Service (*Proc Am A Study of Feeble-minded* 56 395, 1932), reports that during the 3 years from 1928 to 1931, approximately 3000 persons who applied at American Consulates in Europe for the privilege of emigrating to the United States from 6 European countries were given intelligence tests in order to establish more reliable standards than were then possessed for judging the intelligence of immigrants. The law provides for the exclusion of mental defectives, but it was discovered some years ago that American norms were not fair to immigrants. Beyond the exclusion of persons with higher education there was no selection. Persons were picked out at random and given the special examination. They represented a fair cross-section of immigrants without higher education who applied during the 3 year period and who came to the

United States from these countries in former years

The author summarizes these results as follows

Three thousand prospective immigrants who had no more than the usual common school education were given simple nonlanguage tests in 6 European countries

Some illiterates were examined in one country and the difference in median test age between the best group of literates, the males, and the worst group of illiterates, the females, was 4.85 years. The difference was presumably caused by environment and education.

Literate children with a chronological age of 9½ years scored as high as their illiterate mothers, but these mothers scored very low. The tests favor children. A group of children of German immigrants had an intelligence quotient of 115.25. German adult skilled workers had an intelligence quotient of 95.

The difference in test age between the best and worst of all literate national groups ranges from 1.5 to 6.5 years depending on the test.

The difference in test age between the best and worst national groups of literate skilled workers on a performance test equally fair to all of them was 3.5 years.

The 10 percentile score of the best national group equals the 85 percentile score of the worst national group (all literates).

The scores made in 4 countries were high in spite of the exclusion from the examination of about 12 per cent of the most intelligent.

Twenty per cent of literate males of 1 national group had a test age of 9.5 or less on a test presumably fair to them. They did slightly better on 1 test and worse on others.

The concept "mental deficiency" is not broad enough to exclude all persons whom for social and eugenic reasons it would be desirable to exclude.

The author considers a general lowering of intelligence together with a certain amount of delinquency, crime and institutional support by the state is inevitable where many persons of such low mentality are introduced into the population. Much, if not all, of this

could be avoided if it were legal to exclude all persons above 15 years of age who had a corrected mental age of 10 or lower, *i.e.*, a mental age corrected for the handicap of poor environment and poor education. It was shown that in making this correction, about 4 years would be added to the median test age of some groups of women.

ETIOLOGY—In a clinical review of 1000 patients who were mentally defective, 19.8 per cent of the total group were considered to be due to injuries at birth, 15.3 per cent caused by certain diseases occurring after birth and 64.9 per cent caused by antenatal influences. It was the opinion of the investigator, C. McNeil (Elinburgh M. J. 38:166 (Oct) 1931), that the antenatal influence was some other factor than a defective germ plasm. The patients were divided in a primary group in which no etiologic factor was evident (567 cases) and a secondary group composed of those in whom some possible etiology was discovered (433). The classification was as follows:

Primary Amentia, 567

Simple primary amentia	292
Mongolism	246
Microcephalus	25
Various	4

Secondary Amentia, 433

Birth injury	198*
Hydrocephalus and meningocele	58
Epilepsy	44
Sporadic cretinism	46
Congenital syphilis	29
Hemiplegia	16
After meningitis	12
After encephalitis	4
Amaurotic family idiocy	4
Tuberous sclerosis	2
Various	17

* This total includes 34 cases of spastic diplegia without clinical evidence, at or after birth, of birth injury.

A J Rosanoff (Am J Psychiat 11 289 (Sept) 1931) made a study of mental diseases in twins and in the group of mental deficiency cases accumulated records of 5 pairs of twins, one or both of each pair being mentally defective. In comparing the findings in monozygotic and dizygotic twins, among the 35 pairs of *monozygotic twins* he found both twins to be affected in 33 instances, and only 1 affected, the other having normal intelligence, in 2 instances. Among the 60 pairs of *dizygotic twins*, both twins were affected in 32 instances and only 1 in 28 instances. He summarizes his work as follows

1 Mental deficiency seems to be consistently more common in the male than in the female sex

2 This is most strikingly shown in opposite-sex twins. Among 27 pairs of opposite-sex twins, both had mental deficiency in 11 instances, the male alone in 11 instances, and the female alone in 5 instances

3 It appears in a similarly consistent way that girls make a slightly better showing than boys in intelligence tests and in scholastic record

4 These facts suggest that gene factors of intelligence may in some cases be carried in the X-chromosomes and not only in the autosomes, or, in other words, that there may be a sex-linked factor in some cases in the genetic history of mental deficiency and of general intelligence

5 In order to make the simplest provision in biological symbols and formulas for a sex-linked factor, it is necessary to assume the existence of 6 possible types of males, 9 types of females, and 54 types of mating

6 Theoretically, from 38 of these types of mating only normal offspring can result

7 The mentally deficient offspring that may result from 8 other types of mating may be expected to be equally distributed in the two sexes, as far as the possible influence of any sex-linked factor is concerned.

8 Only male mentally deficient offspring can result from the remaining 8 types of mating

9 Among phenotypes it is, of course, impossible to distinguish the various genotypes

represented in the symbols and formulas listed in this paper. However, it may be readily deduced from the formulas that when both parents are mentally deficient or when the father alone is mentally deficient, an equal distribution of mental deficiency in the two sexes of offspring may be expected. When both parents are normal or when the mother alone is mentally deficient then, too, mentally deficient offspring of both sexes may result, but their distribution will not be equal in the two sexes, for the cases in which a sex-linked factor may be operative will be included in this part of the material. Here, according to theory, any relative excess of mental deficiency in the male sex must be, at least in part, attributed to a sex-linked factor.

10 A reinvestigation of a part of Goddard's published material, selected by reason of relevancy to the questions raised in this contribution, bears out the assumption of a sex-linked factor in the genetic history of mental deficiency. The general relative excess of mental deficiency in the male sex is, however, greater than can be accounted for by this factor, to some extent it must be attributed to some other factor or factors.

A large group of twins were examined by the personnel of the Walter E. Fernald State School in Waverly, Mass., between September, 1918, and April, 1932. The results of this study are reported by P. A. Parker (Proc Am A Study of Feeble-minded 56:213, 1932), whose conclusions are as follows:

1 This study includes 104 sets of retarded or maladjusted twins, the majority of whom have been diagnosed moron

2 The correlation between the difference in mental age and the difference in physical measurements is too small to have any real significance

3 The group, as a whole, shows definite physical inferiority, which is particularly marked in the case of head circumference—about 80 per cent measure below normal with an average deviation of 19 cm

4 There is a positive coefficient of correlation of .84, with a probable error of 2 between the difference in mental age and the difference in school accomplishment.

5 About one-half of the difference in individuals born of the same parents at the

same time is due to gene variations and the other half to environmental factors

6 The 26 pairs of identical twins are found to resemble their mates more closely than do the 78 pairs of fraternal twins, but the striking thing is the uniformity of the pairs of the entire group

In a study of the *children of mentally defective mothers*, C S Woodall (*Ibid* 56 328, 1932) attempted to locate and examine all of the offspring of mothers who had been patients of the Walter E Fernald State School, Waverly, Mass from January 1, 1923, to January 1, 1931 The examination of these children consisted of a Fernald ten-point scale and all children were seen and diagnosed by a psychiatrist Children below the age of 6 years were not included in the study, inasmuch as it was believed that psychometric results at an earlier age than this are much less valid

After excluding all cases of mental defect which are due to secondary causes, such as injury, disease, etc, the author considers that 2 concepts of the nature of the conditions are possible, one being that cases of mental deficiency simply represent the lower end of the scale of intelligence, intelligence varying in degree throughout the total population, and according to this theory the question of the transmission of the mental defect would be a question of the transmission of a low order of intelligence The second theory conceives of mental defect as being a true defect or a condition which is fundamentally and innately characteristic and which differs qualitatively as well as quantitatively from the normal In the light of this theory, the transmission of mental defect would not be a question of the transmission of intelligence, but would have to do with the transmission of characteristic defects as an entity He does not believe that feeble-mindedness

behaves as a Mendelian recessive trait, stating that he has never seen any real evidence to support such a belief He summarizes the results of his studies as follows

1 Out of 385 children of 192 mothers who were patients of the Walter E Fernald State School, 128 died and most of these died in infancy

2 Examinations were obtained on 119 children The mental level of these children ranged from imbecile to superior mentality, 16 per cent were of average or superior mentality, while 44 per cent were mentally defective The average mental level of the children was superior to that of the mothers

3 The general physique of the children exceeded that of the mothers and the children correlated well with their individual mothers in this respect

4 There was a high positive correlation between the I Q's of mothers and children This correlation was most marked in those mothers who appeared to be of the hereditary defective type

MORTALITY.—The reason for the high mortality rates among mental defectives has never been explained In an investigation of the death rates among such patients, B Malzberg (*Psychiatric Quart* 6 226 (Apr) 1932) noted that the mortality was 3 to 6 times greater among the mentally retarded than in normal groups Twenty-five per cent of the mentally defective children die at 4 to 6 years, 50 per cent in 13 to 17 years, and 75 per cent before reaching 28 to 29 years of age

In England, *tuberculosis* is a frequent cause of death in institutions for the feeble-minded In searching for an explanation of this, A N Bronfenbrenner (*Am Rev Tuberc* 25 334 (Mar) 1932) performed tuberculin tests on a large number of such patients He found a smaller percentage of patients reacting positively to the tuberculin test in an institution for the feeble-minded than in average groups elsewhere

Among 2334 such patients of all ages 40.5 per cent gave positive reactions. The positive reactions among the children of school age in this group were fewer in number than in normal school children in the same community. It was also noted that the percentage of positive reactions was higher among children who had been admitted to the institution but a short time before, than in children who had been there for a longer time. Patients with the less severe mental afflictions had positive reactions more frequently than those who were more demented. These results would tend to indicate that tuberculous infections were not more numerous in institutions of this nature, but that the high mortality rates from tuberculosis was due to a lowered resistance, and the author was inclined to believe the mental defects of these patients had some definite influence on the course of the infection.

A comprehensive study of the mortality rates among 8976 mentally deficient patients was made by N. A. Dayton, C. R. Doering, M. M. Hilfery, H. C. Maher and H. H. Dolan (New England J. Med. 206:555 (Mar. 17), 616 (Mar. 24) 1932). The mortality rate of idiots was about 5 times that of the general population, of imbeciles about twice as great, and of morons about the same rate as the general population. In the moron group, infant mortality was not as high as in the more demented groups. The mortality rates of male idiots under the age of 30 were higher than those of female idiots, but the mortality of the latter was very high up to the age of 20. Death rates of the retarded patients of all ages were a little more than twice as high as those of the general population. Statistics of a similar nature, gathered in a U. S.

census study, showed even higher mortality rates than the above.

The principal causes of death among the mentally defective patients were influenza (16 per cent), pulmonary tuberculosis (14 per cent), bronchopneumonia (8 per cent), lobar pneumonia (7 per cent), heart disease (6 per cent), epilepsy (4 per cent), diarrhea (4 per cent) and measles (3.9 per cent). Grouping these together, it was found that epidemic, endemic and infectious disease were the cause of death in 42 per cent of the entire group of patients, respiratory diseases in 19 per cent, diseases of the nervous system in 10 per cent, gastrointestinal diseases in 8 per cent and diseases of the cardiovascular system in 5 per cent. In comparing the mortality rates of these various diseases with those of the general population, it was found that *diarrhea*, *epilepsy*, *bronchopneumonia* and *influenza* were considerably above the average and, therefore, should be considered as the primary cause of death in this group of defectives.

Estimating the life expectancy of the different groups of mental defectives, it might be forecast that of every 100 male idiots, 100 male imbeciles and 100 male morons of 10 years of age, there would be left at the end of a decade, 76 idiots, 87 imbeciles and 96 morons. Similar groups of females would be represented by 71 idiots, 87 imbeciles and 94 morons. The expectancy of life of 100 normal individuals during the same life span is 97.

PROPHYLAXIS AND TREATMENT.—In a report on the problems of mental deficiency, a committee appointed by the British Medical Association (J. A. M. A. 99:317 (July 23) 1932; London correspondence) concluded that, although heredity was

thought to play an important part in the incidence of defective mentality, the exact percentage of such occurrences could not be determined. If the patients who were definitely defective were sterilized by operation, the incidence of the disease might not be reduced materially, at least not for several generations, because many of these afflicted persons are not discovered and reported. In addition, it was thought there were "mendelian carriers" of mental deficiency who seem to be normal but are capable of procreating defective children. In regard to the small number of mental defectives who definitely should not be allowed to propagate, the committee believed that sterilization was justifiable so long as the procedure is not used as an indication for the discharge of such a patient from an institution, especially when he is a social menace. The committee insisted that supervision of the sterilized patients should be maintained in order to prevent the spread of venereal disease. It was recommended that colonies be established for the mental defectives where special training and a suitable environment could be provided.

The present status of the incidence of mental deficiency and the effectiveness of its treatment and prevention was reviewed by W. M. English (*Am J Psychiat* 11 1 (July) 1931). The incidence of mental defectiveness in England in 1928 was about 10 out of every 1000 persons or 1 per cent of the total population. In the United States about 1.5 per cent of the population have intelligence quotients of 75 or less. The usual distribution of the grades of mentality of this class has been found to be about 5 per cent idiots, 20 per cent imbeciles, and 75 per cent feeble-minded. In the author's opinion, the majority of

investigations have indicated that 80 per cent of the mentally defective class owe their condition to hereditary factors. In England, the proportion of feeble-mindedness to the total population has risen from 4.02 per 1000 in 1906 to 8.0 per 1000 in 1926. The most effective remedies for prevention of mental deficiency were thought to be either segregation or sterilization of the patients. The former method is very costly, being estimated at \$5,000,000,000 a year for the entire civilized world and yet is far from effective. New York State, for example, has been very active in creating institutional care for defectives and yet is able to care for only 7500 such persons, while a possible total of some 40,000 are still at large in that state. Sterilization was thought to offer a much more satisfactory method in dealing with the problem.

In an article dealing with recommendations for the training of high grade mental defectives in institutions for future life in the community, Sanger Brown, Jr (*Mental Hygiene* 16 440 (July) 1932) suggests that separate departments be established for their care in institutions for the feeble-minded, so that they may be segregated from the lower grade patients and managed as if they were normal children. Kindergarten facilities should be provided and, having arrived at school age, these children should attend, if possible, special classes in regular community schools or have the benefit of a modified curriculum. It is further suggested that boarding homes be established for some of these children so that they would have family influences; be sent to school, church and entertainment, and take part in the regular life of the community.

Van de Wall (*Proc Am A Study of Feeble-minded* 56 70, 1932) believes

that a musical program has a place in the treatment and education of the mentally deficient, since it may be considered as a socially educative force and is for many of the mental deficient a stimulus of physiopsychological energy. Musical sounds are said to act as foci of attention and the patients respond by physical reactions to music, expressed through an increased tendency toward motor activity, from slight motions with hands and feet, body and head, to jumping and dancing, and from sighing and moaning to singing and shouting. Increased physiopsychological function of the mentally deficient under the stimulus of music leads, it has been noticed, in many cases to an increase of sociability and socialized action. Benefit is not confined solely to the higher grade patients, but even low grade idiots are said to show favorable response to various types of musical sounds.

FEEBLEMINDEDNESS.—Although the term of feeble-mindedness is frequently used in a general sense to denote all degrees of mental deficiency, strictly speaking its use is limited to the less retarded mentalities. *Idiocy* describes a mental development of an average child of 2 years of age or less, the term *imbecile* designates a mental age of more than 2 and less than 7 years, and the word *moron* or *feeble-mindedness* designates a mental age of 7 to 12 years. These definitions of degrees of mental retardation vary with different authors and in different localities.

The English Mental Deficiency Act states that feeble-mindedness may be defined as "mental defectiveness . . . not amounting to imbecility, yet so pronounced" that the afflicted person is "permanently incapable . . . of receiving proper benefit from the instruction

in ordinary schools." This definition was quoted by A. D. Fordyce (*Arch. Dis. Childhood* 7: 80 (Apr.) 1932), who reported that 2128 children of school age in Liverpool had been certified as mentally defective during the 7 years from 1925 to 1931 inclusive. Of this group, 1540 children were found to be feeble-minded, 530 imbeciles, and 32 idiots. About 1 child in every 130 of the Liverpool school children was found to be mentally defective and 1 in every 10,000 school children had to be excluded from school because of some behavior problem.

In special schools for feeble-minded children the average intelligence quotient of the pupils was between 60 and 70. With special training many of these children learned to do some sort of useful work and there were some children who were thought to be mentally retarded who later proved to have normal intelligence. About 24 per cent of a group of 1200 supposedly feeble-minded children fell into this class and the author concluded that the prognosis of so-called mental retardation may be favorable in certain instances.

Incidence.—Le Roy M. A. Maeder (*Proc. Am. A. Study of Feeble-minded* 56: 33, 1932), in a paper dealing with the problem of feeble-mindedness in Pennsylvania, estimates conservatively that 1 to 2 per cent of the total population may be classified as defective. On this basis Pennsylvania has about 150,000 mental defectives. Experience has shown that 10 per cent of the total feeble-minded population should be in institutions.

MONGOLIAN IDIOCY.—**Incidence.**—R. L. Jenkins (*Arch. Neurol. and Psychiat.* 28: 228 (Nov.) 1932), considering the etiology of mongolism, states that any family tendency is ex-

tremely slight and points out that in dizygotic twins only 1 member of a pair is affected, while in the case of monozygotic twins both are mongols. The incidence of the condition is said to vary widely as a function of the age of the mother, increasing rapidly with advancing maternal age. There is a 30,000 per cent increase in the incidence of mongolism between children born to mothers aged from 15 to 19 and the children born to mothers aged from 50 to 55. The relation between the incidence of mongolism and the age of the father is merely a result of the correlation between the ages of the parents according to the author. A new hypothesis concerning the etiology of mongolism is presented, the condition being ascribed to a diminished viability of the ovum.

The frequency with which mongolism occurs has been referred to in above paragraphs. In a study made by A. Bleyer (*Am J Dis Child* 44:503 (Sept) 1932) of 47,923 children seen in an out-patient dispensary over a period of years, 777 patients were found to be mentally defective and of these 115 were Mongolian idiots. This is a percentage of 0.23 for the entire group. The ages at which most of these Mongolian idiots were first seen and diagnosed was 1 to 3 years. The great majority occurred in the white race, although the author observed 8 who were negroes and in 1 instance, the diagnosis was made in a Mexican child. The addition of this race to others previously reported in which mongolism has been found, brings the total to 31. In regard to sex, the males predominated with the proportion of 83 among a total of 137 patients observed by the author.

Etiology.—It has usually been the contention that mongolism was more

frequent in children born late into a family. The subject has been reviewed by B. Schulz (*Ztschr f d ges Neurol u Psychiat* 134:268, 1931). He studied the subject of the etiology of mongolism from the standpoint of family histories, order of birth and the geographical distribution of 80 such patients. In his opinion, the results indicated that mongolism occurred more frequently in the later born children than mathematical expectation would account for. It seemed improbable that the age of mother at time of birth of the Mongolian idiot, or inheritance had any significance in the etiology of this condition. Certain physical malformations which frequently occur in mongolism were found in a certain number of mothers and fathers, but the frequency was not much greater than in the parents of normal infants. The author concluded that the basis of the condition lies in some noninherited disease of the mother. In regard to the geographic distribution of mongolism, the prevalence is greater in some regions than in others, but it was impossible to discover any environmental or hereditary factor which contributed to the incidence.

F. G. Crookshank (*The Mongol in Our Midst*, 3d Edit. Kegan, Paul, Trench, Trubner and Co., Ltd., London, 1931) is said to postulate that the "mongoloid" type is a fossil remnant, as it were, of an earlier phyletic anthropos and its occurrence and reoccurrence in the present population is of importance, medically, pedagogically and eugenically, in that such protomongols are of a stock that remain infantile and will not grow up. The defective or cretanoid or other normal deficiency type is in need of differentiation from the pure genotype variety, since, for the former, environmental factors shape the phreno-

type, while for the latter the inheritance factors are of paramount significance for eugenics especially

Diagnosis.—Very little is known of the etiology or pathology of Mongolian idiocy and the diagnosis of the condition must be made from certain symptoms and clinical findings. Frequently only a few of the characteristic signs are present and some clinicians maintain that there is no single sign which might be called pathognomonic of mongolism. This was the opinion of R. Turpin (*Semaine d'hôp de Paris* 7: 631 (Dec 31) 1931) after a careful observation of all the findings and peculiarities of 27 mongoloid patients. Mental retardation was one of the common characteristics of patients with this mongolian type of facial formation. Hypotonicity of the muscular system was a frequent finding and various congenital abnormalities were observed in this group of patients, but there was no definite evidence of any glandular dyscrasia found.

MICROCEPHALUS — Etiology.—Occasionally, a very definite *malformation of the brain* leads to an arrested development. R. J. A. Berry and R. M. Bates (*Brit M J* 1: 830 (May 7) 1932) reported an instance of a very small patient who appeared at first to have a macrocephalus but the head later proved by measurement to be a microcephalus. The patient had a very low grade of mentality and was dull, apathetic, and able to perform only a few simple actions. At autopsy, the brain was found to be undeveloped and the ventricles greatly dilated with a great reduction in the cortical layers in portions of the cerebrum and cerebellum. It was assumed that the number of neurons present could only have been about a third of the normal number. Similar cases of porencephaly have been

reported as the result of an encephalitis and subsequent deterioration of brain substance, but the above writers were inclined to believe that all such cases are due to an arrest in cortical development beginning about the sixth month of fetal life.

Microcephalus is usually accompanied by considerable failure of mental development but several exceptions were reported recently by B. Hechst (*Arch f Psychiat* 97: 64, 1932), who observed 4 instances in which there was a definite microcephalus without any defect in mentality. In 1 case, a woman reached the age of 73 years without any evidence of impairment of intellect. At autopsy it was found that her brain weighed only 85 grams. The circumference of the cranium measured 501 mm (20 inches) and the diameters were 143 mm (5.7 inches) by 132 mm (5.2 inches). The macrocephalus was assumed to have been due to an *arrested development in early infancy*.

AMAUROTIC FAMILY IDIOCY.—**Etiology.**—In a review of the subject, H. Vollmer (*Ztschr f Kinderh* 51: 259, 1931) points out that previous investigators have considered the disease to be a familial deviation of the lipid metabolism of the brain cells which resembled the findings of the lipid histiocytosis or Niemann-Pick's disease. He was able to find only 2 reported cases in which the two diseases occurred simultaneously in the same individual. An accumulation of lipid substances has been noted in the ganglion cells, which was thought to be due to the liberation of a hydrophilic colloid from some pathologic metabolism of protein material.

Pathology.—In an earlier communication, Schaffer (*Arch f Psychiat* 93: 767, 1931) described the differences in the pathologic findings of Tay-Sachs'

and Niemann-Pick's diseases *Tay-Sachs' disease* was characterized by (1) degenerative glial elements with sudan staining nuclei which do not occur in the other disease, (2) the lack of involvement of meninges and vessels with hematoxylin staining, (3) the lecithin precipitation products in the cytoplasm of ganglion cells and the presence of silver staining bodies. In *Niemann-Pick's disease* there was (1) a primary involvement of the mesodermic elements, with secondary involvement of the entodermal and ectodermal tissues, and in this instance the nuclei assumed a mulberry shape with hemoxylol stain; (2) hematoxylin stain sprinkled throughout the meninges and vessel walls; (3) a simple diffuse staining of the lecithin material of the cytoplasm, but the absence of any silver staining bodies.

From clinical aspects also, certain fundamental differences have been noted in the two diseases. The enlargement of the liver and spleen which is characteristic of Niemann-Pick's disease, may also occur in amaurotic family idiocy, but this is not always the case, according to K. von Sántha (*Ibid* 93 675, 1931). He reported 3 instances of amaurotic family idiocy in children 13, 18 and 20 months of age, respectively, and from the study of these cases he concluded that Niemann-Pick's disease and the Tay-Sachs' syndrome were related, but that the latter should be considered an isolated disease involving the ganglion cells which are ectodermal products while the spleen and liver enlargement has an entirely different etiology.

Treatment.—In regard to therapy in amaurotic family idiocy, H. Vollmer (*loc cit*) expressed the belief that little could be done which would be of any value except to extend the knowl-

edge of the pathologic and chemical disturbances.

The author observed the disease in 2 children who were cousins. From a study of the family history, numerous diseases of the nervous system were found to have occurred in the parents although none had had Tay-Sachs' syndrome. One of these children was treated with liver, the other with a brain lipid extract. No beneficial results were noted in either instance and it was thought that the oral administration of such substances would be useless.

AMAUROTIC FAMILY IDIOCY.

—*Juvenile Form*—Torsten Sjogren (*Separat ur Hereditas XIV, Gleerupska Universitets, Bokhandeln, Lund, 1931*), in an exhaustive monograph on this subject incorporating a comprehensive study of 120 cases, divides the progress of the disease into 5 stages.

1 Blindness (2 years)

2 Mental deterioration, speech disturbances, epileptiform seizures (2 years later)

3 Outspoken dementia, apathetic, irritable, unable to concentrate, loss of interest, can only answer simple questions, speaks in monotone. No hallucinations or delusions. Can assist in own care.

The neurological findings in this stage are constant. There is poverty of bodily movements, head and trunk bent forward, knees and elbows flexed and held stiffly, gait, *marche à petits pas*, Romberg negative, Babinski negative, intention tremor, pupillary reflexes active, slight impairment of sensory disturbance, convergent or divergent strabismus, hands and feet cyanosed.

4 Advanced helplessness, cannot feed or dress himself, sits staring into space, mask facies, speech gone, tongue protruded, strong crying or laughing, Romberg positive, hyper-tonicity of muscles, beats time with feet before starting to walk.

5 Idiot, helpless bed patient, cannot walk, stand, or sit up, body completely flexed, muscles rigid, pupillary reflexes spastic, Babinski positive. At this stage, frequently die of intercurrent infections.

The author's conclusions, as translated by R MacLachlan Franks, are (1) It has been shown that juvenile amaurotic idiocy occurs in Sweden with a relatively considerable frequency as compared with the extraordinary scarcity generally emphasized in foreign literature (2) It has been established that the ophthalmoscopic changes, as well as the growth and development of neurological symptoms, show a remarkable uniformity and constancy in their progressive course, especially the important position of the symptoms of extrapyramidal motor character, the disturbances of the "motorik," the disturbance of the gait in the so-called *marche à petits pas*, often with *dinmarche trepidante*. The increasing cowering down position, the hypertonia of a markedly rigid type, have been emphasized. The typical development and the symptomatology of the disease have been described in the form of a division into stages. The disease in its typical manifestations shows such a characteristic picture that, as a rule, it should be possible to give a clinical diagnosis, even if it should occur singly in a family (3) Juvenile amaurotic idiocy follows with a high degree of probability a recessive and monohybrid course of heredity (4) The disease has to be regarded as being entirely different from the infantile form as far as hereditary-biological aspect is concerned (5) The ancestors who with a high degree of probability have been shown to be heterozygotes show a distinct tendency to accumulate in several limited areas in different parts of the country (6) The hereditary-statistical investigations concerning the occurrence of dementia precox, oligophrenia and epilepsy among aunts and uncles of the patients, have yielded a strikingly high rate of in-

cidence of diseases. However, no significant differences with regard to individual diseases in comparison with those found for the average population have been obtained.

LAURENCE-BIEDL SYNDROME.—Amaurotic family idiocy is a disease which is usually fatal in the first few years of life. A related disease which occurs in later childhood and has many of the symptoms of the infantile type has been called the *Laurence-Biedl syndrome*. The characteristics of this disease are mental deficiency, dystrophia adiposogenitalis, retinitis pigmentosa and frequently polydactylism. The symptom complex is closely related to Froehlich's syndrome which is characterized by adiposity, small genitalia and a lesion of the pituitary gland. A. M. Ornstein (Am J M Sc 183 256 (Feb) 1932) reported 3 instances of this disease which occurred in members of one family. The ages of these children were 1, 2, and 12 years respectively. They were all very obese, were mentally deficient and had a retinitis pigmentosa, did not have polydactylism, and there were no symptoms of definite pituitary disturbance. According to the author, 42 cases of this syndrome have been reported in the literature previously. It was suggested that *heredity* played an important part in the etiology of the condition, probably through a failure of the development of prosencephalon (forebrain).

F. H. Ritter (Ztschr f d ges Neurol u Psychiat 141 402 (Aug. 20) 1932) reported 3 children, 8, 9 and 10 years of age, respectively, who had the feeble-mindedness, obesity and an atypical retinitis pigmentosa. Only 1 had polydactylism, and this one was considered to be a true case of Laurence-Biedl syndrome, while the others were

diagnosed as juvenile types of amaurotic idiocy. The tendency to classify these two types of disease in close relationship with each other is based on the similarity of the anatomic lesions of the ganglion cells and the disturbance of fat metabolism. It was suggested that many infants with amaurotic family idiocy may have some slight obesity which is often overlooked, while in later life this characteristic is much more obvious.

A slight variation from the usual symptoms of the Laurence-Biedl syndrome was observed by E. Weiss (Am J M Sc 183 268 (Feb) 1932). In 2 sisters aged 16 and 26 years, the symptoms of mental deficiency and adiposity were typical but instead of retinal lesions, these patients were deaf.

MERCURY.—POISONING —

Treatment.—Emphasizing the extent and importance of the occurrence of gangrenous colitis in cases of acute mercuric chloride poisoning, S. S. Berger, H. S. Applebaum and A. M. Young (J A M A 98 700 (Feb 27) 1932) report the results of their observations in 163 cases of mercury poisoning and recommend immediate cecostomy and constant lavage to prevent the gangrenous colitis. The authors state that in their series it was evident that there were 3 principal causes of death: (1) shock and hemorrhage, which came on promptly, (2) renal damage, as early as 3½ hours after the ingestion and reaching its maximum before the sixth day; (3) gangrenous colitis, from 6 to 12 days after ingestion, *i. e.*, later than the renal damage. Pathologically, it reached its maximum by the ninth day. Those cases coming to autopsy between the sixth and the thirteenth day showed the most severe lesion to be gangrenous

colitis, with the kidneys already in a state of advanced healing, the patients thus survived the usual gastric and renal damage, but succumbed to a gangrenous colitis.

Believing that the delay in instituting cecostomy until symptoms referable to the colon had developed has been responsible for the poor results obtained following this procedure in the past, these investigators instituted the idea of performing cecostomy as soon as a diagnosis of mercury poisoning could be definitely established, provided the patient is not in extreme shock. In 3 such cases, cecostomy was performed 15, 19 and 19½ hours, respectively, after the ingestion of the mercury. All 3 patients recovered. The authors have adopted this procedure as a routine measure in suitable cases and recommend that it be tried by others.

E. R. Blaisdell (Maine M J 23 3 (Jan) 1932) emphasizes the importance of administering large doses of sodium thiosulphate intravenously in the treatment of acute mercurial poisoning. In reporting a series of 10 consecutive cases, all of which recovered, the author states that at least 6 Gm (1½ drams) of sodium thiosulphate should be administered daily for 3 consecutive days and continued longer if indicated. In the author's opinion, the failure to obtain better results with sodium thiosulphate in the past has been due to an inadequate dosage.

On the other hand, A. G. Young and F. H. L. Taylor (J Pharmacol and Exper Therap 42 185 (June) 1931), following experimental studies on the effect of sodium thiosulphate on the toxicity of mercury in a controlled series of poisoned rabbits, concluded that sodium thiosulphate is an ineffectual form of treatment and that, in their

opinion, a specific antidote for acute mercury intoxication has not been found. This opinion has been corroborated frequently by other investigators. In the experiments cited, sodium thiosulphate in large and repeated doses did not decrease the toxicity of mercuric chloride, mercury succinimide or mercury salicylate. It appeared to slightly decrease the toxicity of potassium mercuri-tetraiodide. It did not decrease the tissue injury produced by the mercury compounds studied and in no way influenced the rise of the blood nonprotein nitrogen, the height of which these investigators consider is of definite prognostic significance in mercury intoxication.

MESENTERY.—TUMORS AND CYSTS.—From a review of the records of 22 cases of mesenteric tumor in the files of The Mayo Clinic, F. W. Rankin and S. G. Major (Surg. Gynec. Obst. 54:809 (May) 1932) state that from the embryological point of view it is conceivable that mesenteric tumors may arise from displaced remnants of the genital gland, the Wolffian body or its duct, or the Muellerian duct. Nevertheless, there is no proof that any of the tumors described owed their *pathogenesis* to such embryonic remains. The data contribute nothing to the origin of *serous cysts*, but as an epithelial lining was not demonstrable in these tumors, it is conceivable that they may have had their origin in hemorrhage into the mesentery, the solid constituents of the blood having been absorbed. The endothelial lining of the *chylous cysts* favors the view that these neoplasms are due to dilatation of the lymph spaces rather than to the effusion of chylous material into a preformed cyst. The *sanguineous cysts* appear to be due to the effusion of blood into the mesentery, and do not

seem to be hemangiomatous. The pathogenesis of the *lipomata* and *sarcomata* is easier to understand than that of the cystic tumors.

In the cases reviewed, solid neoplasms were more frequent than cystic neoplasms, and sarcomata constituted the largest single group of tumors. The incidence of the tumors was about the same in both sexes.

All of the chylous cysts occurred in the mesentery of the small intestine.

The *prognosis* of the benign tumors is favorable and that of the malignant tumors is unfavorable.

The *diagnosis* of mesenteric neoplasms is difficult, but in the presence of a mobile abdominal mass extrinsic to the gastrointestinal tract, the possibility of a tumor of the mesentery should be borne in mind. Mesenteric neoplasms are probably much more common than has been believed.

Serous Cysts.—Among the tumors reviewed there were 2 serous cysts. In neither was a lining membrane demonstrable in the cyst wall, although multiple sections were made.

Chylous Cysts.—Chylous cysts, of which there were 3 among the tumors reviewed, differed from the serous variety in 2 important respects. They all had a definite endothelial lining and they all occurred in the mesentery of the small intestine. Definite lymph follicles could not be demonstrated in the walls of these cysts, although there were many irregular accumulations of lymphocytes.

Sanguineous Cysts.—The source of the blood in sanguineous cysts is a matter of conjecture. In neither of the 2 cases in the series reviewed was a history of trauma elicited, and in neither was it possible to discover any coexisting condition which could have been re-

sponsible for the hemorrhage into the mesentery

Lipomata.—Lipomata are relatively common in the mesentery, and it seems very possible that small, fatty tumors occur more often than is generally supposed. Fatty tags, and even larger accumulations of fat, are frequently found in the mesentery in the course of abdominal operations. Among the tumors reviewed by the authors there were 5 lipomata.

Fibromata.—Fibromata are of interest chiefly because of their rarity and because they are prone to be confused with malignant growths of the mesentery. Among the tumors reviewed there were 2 fibromata, one was a fibromyoma and the other a fibromyxoma.

Malignant Tumors.—Secondary tumors of the mesentery were excluded from consideration. Among the tumors there were 8 sarcomata.

Mesenteric Cysts in Nurslings.—These are discussed by A. Martin (Semaine d'hop de Paris, 8 311 (May 31) 1932). The author reports a case of *cystic lymphangioma* of the mesentery in a child, aged 18 months. In this case the cystic fluid, which may be chylous, serous, hemorrhagic or purulent in lymphangiomas, was clear and pale yellow. The classic *symptoms* are signs of compression, gastric and intestinal disturbances, vomiting, diarrhea in some cases, constipation in others, and sometimes subocclusion. There is an increase in the volume of the abdomen. Percussion may give variable signs. The *complications* in these cases are due to increase in volume, causing disorders due to compression, suppuration and rupture of the cyst, which may occur without infectious phenomena and lead to serous or chylous peritonitis. *Diagnosis*, the author thinks, is always diffi-

cult. Theoretically, the mesenteric cyst is recognized by its median topography, lateral mobility and incomplete and variable dulness on percussion, but in practice the diagnosis is never made. In the case reported the tumor was in the left hypochondrium, it was not movable in a transverse direction, this being characteristic of the retroperitoneal cyst, which is so firmly attached by its pedicle and lumbar implantation as to be immobile, the percussion sound was dull. In discussing *treatment*, the author counsels against puncture. He was able to split this tumor and accomplish a complete *extirpation*, avoiding the mesenteric vessels, as the tumor was well isolated and there was no inflammation. Frequently, in attempting total removal of the cyst, there is a risk of injury to the mesenteric arteries or veins. An operation should be performed that produces less shock. *Marsupialization* of the cyst may have to be done, cure by this method is slower, but operative failures are avoided. The surgeon should not try to remove an inextirpable cyst, he should rather limit himself to *partial resection*.

INFARCTION.—*Ileomesenteric infarct* from segmental ulcerous enteritis is reported by P. Moulouguet (Bull et mém Soc nat de chir 57 1504 (Dec 5) 1931). The case cited was that of a man, aged 47 years, who sought treatment for abdominal pain which had begun suddenly at 1 o'clock the previous morning. Paroxysms of pain in the umbilical region had recurred all night, and there had been 2 attacks of vomiting. Thirty-six hours after the first attack the patient entered the hospital with a temperature of 37.8° C (100° F). The abdomen was supple. Palpation caused severe pain in the umbilical region and revealed the presence of a

deep elastic tumefaction of inexact limits which was dull on percussion

The next day the patient was exhausted and his temperature was 38° C (100.4° F). He had had 2 more attacks of vomiting. No feces or gas had been passed, but there was no pain of the colic type. The ampulla was empty. The retrourambilical swelling seemed to consist of a distended loop of intestine full of fluid. A diagnosis of volvulus of a loop of small intestine and mesenteric infarct was made.

At operation, sanguinolent fluid was found in the peritoneal cavity. The swelling consisted of a loop of small intestine, at a distance of about 50 cm from the cecum, which presented a severe parietal lesion that evidently was the cause of occlusion. The intestine was purplish-red in plaques, and its serosa appeared inflamed. Above this segment it was distended to 3 times its diameter below. The lesion was strictly limited to a segment from 25 to 30 cm long. The corresponding mesentery was not much thickened. A diagnosis of mesenteric infarct was made and enterectomy was done.

Several days after the operation a bowel movement occurred. On the twelfth day a collection of pus in the pouch of Douglas was found and opened by the rectal route. The patient left the hospital 6 weeks later. On microscopic examination of the specimen, Lecene made a diagnosis of segmental ulcerous enteritis with threatening gangrene.

Like gangrene of the limbs, gangrene of the intestine may result from vascular, mechanical, or infectious causes. A vascular cause is the infarct from mesenteric thrombosis, a mechanical cause, the infarct from strangulation of the intestine, and an infectious cause, the segmental ulcerous enteritis of

Lecene. The ileomesenteric infarct of infectious origin without a vascular lesion is associated with 2 well-known lesions, i.e., phlegmonous enteritis and intestinal ulcer.

Infarcts from infection may be produced in 2 ways. Most frequently, without doubt, they are caused by ascending vascular lesions, venous thrombosis, as in the case of appendicitis studied by Moure. In other cases they are produced without a vascular lesion by advance of the gangrenous progress of the primary enteritis.

Infarction due to ascending infection of intestinal origin may be cured if vascular lesions are absent or if they do not have much tendency to extend. The cause of death is usually the recurrence or continuation of the thrombosing process after operation. Mesenteric thromboses caused by a pelvic infection are usually extensive and fatal. Surgical treatment is most successful in the segmental thrombosis corresponding strictly to a primary intestinal lesion.

In some cases spontaneous recovery has occurred. The surgeon refusing to undertake enterectomy because of the extent of the lesion or the exhaustion of the patient, closes the abdomen and is surprised to see the case recover. Lenormant claims that the supposed infarction in such cases is a volvulus or occlusion by bands or adhesions.

MORTALITY.—IN OBSTETRICS.—*Maternal Mortality.*—The publication of articles in lay periodicals on preventable maternal mortality and the emphasis placed on the subject because of attempts to secure increased appropriations for government bureaus interested in this field, have given the subject more than usual prominence during the last few months. J. M. M.

Kerr of the University of Glasgow and H. R. MacLennan (Lancet 1 633 (Mar 19) 1932) contend that not all cases of puerperal mortality are preventable, since there is infection from within as well as without.

These authorities have made an investigation of all the fatal cases in the Glasgow Royal Maternity Hospital for the years 1926 to 1930, inclusive. Their records include not only fatalities in the practice of the hospital, but cases of sepsis which were transferred from the hospital to special institutions, in which death occurred. The Glasgow investigators point out the obvious fact that maternity hospitals are likely to receive the most serious cases, in many instances patients who have been long in labor and who are then transferred to the hospital for special care. However, their studies of some 2000 cases yield important facts that must be taken into consideration by those who urge that education of the public, antenatal care, the establishment of maternity hospitals, or removal of maternity wards from general hospitals, would solve the difficulties in this situation.

In the first place, Kerr and MacLennan conclude that it is not possible to assess absolutely the preventable factor in all cases of maternal mortality. Government investigations in Great Britain have been able to do this only in 48 per cent of cases, and the present investigators have been able to determine the cause accurately in only 71 per cent. It is found that maternal mortality is influenced by intercurrent diseases, so that 13.7 per cent. of the fatalities were due to this factor. Cardiac disease was the most potent of the intercurrent complications. Among the most serious of causes is the *toxemia of pregnancy*, which may be due to incompetent or in-

adequate antenatal care, 35.3 per cent of all of the deaths in the hospital were due to this complication. Finally, 81 per cent of the fatalities were due to *negligence of the patient* or of her friends, who failed to call attention to serious conditions in sufficient time to permit a successful result, and 14.1 per cent were due to *faulty judgment* on the part of those in charge of the patient. These were cases in which serious obstetric complications seemed to have been improperly handled.

The most significant of the statements made by Kerr and MacLennan, as reported in their investigations, is the following: "the bulk of the unpreventable deaths are due to *puerperal sepsis*. Puerperal sepsis is not, however, entirely unpreventable, factors such as inadequate antenatal care and faulty obstetric judgment exercise a malign influence and predispose to puerperal infection." This does not mean, of course, that the medical profession or any others charged with the care of obstetric cases may relax in any way the precautions against infection. "The organization of institutions," say Kerr and MacLennan, "should be judged by the adequacy with which the emergency obstetrical complications are dealt with, and by the precautions taken to prevent infection. In these respects hospitals with unified control, or, better still, with a resident master, show the most satisfactory results."

The maternal mortality rate for 1929 (the last calculated year) in Philadelphia was 7.4 per 1000 live births. This is higher than the rate for any comparable large city, higher than the rate for Pennsylvania and higher than the rate for the United States as a whole.

To draw attention to this fact and to suggest means for reducing such a

high rate, the Committee on Maternal Welfare of the Philadelphia County Medical Society gathered a series of contributions on maternal mortality (Weekly Roster and Medical Digest (May 28) 1932 and weekly thereafter to Jan., 1933)

I REDUCTION OF MORTALITY FROM ANTEPARTUM HEMORRHAGE—An unnecessarily high mortality in *abruptio placentæ* is due mainly to a failure of correct diagnosis, especially if the hemorrhage is concealed. The treatment in all such cases is **Cesarean section** if the cervix is uneffaced and undilated, which is usually the case. Hysterectomy is not necessary if blood has infiltrated the muscle fibers and has caused an exudation through the peritoneal covering of the uterus. This is due to intra-uterine pressure and the blood is always absorbed.

The mortality of *placenta previa* is not due so much to faulty diagnosis as to faults in treatment. There is no routine treatment but the following methods are suggested:

1 **Cesarean section**; especially if the cervical canal is uneffaced and undilated

2 **Tight vaginal pack**—a temporary measure

3 **Extra- or intra-ovular application of the rubber bag distended with water or air**

4 **Forceps** if the head is engaged, effacement complete and dilatation almost so

5 **Pituitrin** if the presenting part can be driven into the mid-pelvis by exciting severe pains

II RELATION OF CESAREAN SECTION—In Philadelphia last year there were 573 Cesarean sections done with a mortality of 6.8 per cent. A closer cooperation is urged between the attending physician and the hospital, so that cases with complications will be sent in earlier for operation. No case of appendicitis has been operated on too early, no case

requiring a Cesarean was ever operated on too soon

III RELATION OF OPEN HOSPITAL—Open hospitals, by establishing courtesy staffs, must naturally be selective and no physician unless he be duly qualified and properly recommended should be given definite privileges. Even these privileges should be definitely qualified. The ordinary practitioner who in the course of his routine does obstetric work should be limited to normal obstetric deliveries. The specialist should be given full obstetric privileges. In this way the patient, the doctor and the hospital will be protected.

IV SIGNIFICANCE OF BIRTH REGISTRATION—Complete birth and death registration gives health authorities a direct insight into the conditions which exist in the various sections of townships, villages and cities, and enables the proper authorities to get in touch with undesirable conditions and render assistance when the individual is unable to help herself.

V POSTPARTUM HEMORRHAGE.—*Prophylaxis* of postpartum hemorrhage begins with history taking and routine examination of the prospective parturient. Discovered causes of bleeding and individual idiosyncrasies should be appropriately treated during the prenatal period. In labor, atony is prevented by food, rest and help at the proper time. Equipment for all deliveries should contain apparatus for the efficient treatment of blood loss. Do not attempt to deliver the placenta too rapidly in a normal case. Observe rigorous aseptic technic in all intrauterine manipulations. Treatment does not cease with control of bleeding.

VI BORDERLINE PELVIC CONTRACTIONS—Repeated digital examinations, especially vaginal, may add materially

to the dangers of infection, especially if abdominal delivery becomes necessary *Undue mental distress* and *poorly tolerated pains* should be relieved by analgesic drugs.

VII **PODALIC VERSION**—(1) Podalic version should have no maternal mortality as a result of the version itself, if expertly performed, (2) maternal mortality may result from version as in any other obstetrical or surgical operation and from the same cause, (3) version should not be done if there is any doubt concerning the relative size of the child's head and pelvic inlet or in the presence of a high contraction ring

VIII **HYPEREMESIS GRAVIDARUM**—The reduction of maternal deaths from pernicious nausea and vomiting is best accomplished by the early efficient care of the pregnant patient. If the vomiting persists, if acetonuria develops, with a low daily output of concentrated urine and the patient continues to lose weight and strength, she should promptly have intensive hospital treatment

IX **STATISTICS**—The maternal mortality rate is based on 1000 living births. When vital statistics are recorded by different departments, there will appear a difference sometimes of 10 to 20 per cent in rates computed on the same set of certificates, due probably to different interpretations of the original death certificate. Frequently, no mention is made on a death certificate of a pregnancy, which may be the primary or secondary cause of death

X **CRANIOTOMY VERSUS CESAREAN SECTION IN NEGLECTED LABOR CASES**—The length of time during which a woman has been in labor with ruptured membranes, together with frequent vaginal examinations, constitutes the condition best described as the presumably infected case, and Cesarean sec-

tion in this type of case—even in the presence of a living child—should be looked upon as a dangerous operation even though there may be no elevation of temperature. Craniotomy, even upon the living child would be the safer procedure for the woman if the cervix is in the condition to permit this to be done

XI **PRENATAL CARE TO REDUCE MATERNAL MORTALITY**—When it is realized that in the United States nearly two-thirds of the puerperal deaths in the large cities are due to causes which need not have occurred, then the attention is called forcefully to the importance of prenatal care

XII **ABORTION**—It is probable that abortions may be held accountable for from one-quarter to one-third of the so-called deaths from childbirth in Philadelphia. Hemorrhage and sepsis combine to bring about the disastrous result. Hospitalization is urged in every case of abortion

In 1931 there were 183 cases of abortion admitted to the gynecologic ward of the Philadelphia General Hospital, or 38.1 per cent. of the total admissions to that ward, with 5 mortalities, a death rate of 2.9 per cent. In the maternity division of the University Hospital in 1931 there were 741 patients admitted, of these, 606 were deliveries and 59 were abortions. Of the abortions, 12 were septic, 5 therapeutic, and 5 threatened. There were 2 deaths. Deaths from septic abortion swell the roll of maternal mortality statistics. The author feels that only by reliable contraceptive advice to patients who need it will any advance be made in checking the abortion evil.

XIII **OBSTETRIC STAFF CONFERENCES**—The influence of conferences is exerted in many ways but notably by

(1) training the staff in the technics and in the methods of practice of the hospital until, throughout the service, everything is always done by all in one uniform manner. Without this fundamental uniformity, the value of established methods cannot be determined, (2) developing in each member of the obstetric and nursing staff an individual conscience concerning the need to do the prescribed thing in the correct way—a state of mind that ultimately results in a corporate pride and a hospital consciousness.

XIV ANESTHESIA—The author advocates the use of chloroform in obstetrics. Safe for the eclamptic, the cardiac, and the ordinary nervous patient, it may be entrusted to a nurse, always under the doctor's watchful eye, or to an interne or assistant willing to obey orders. The 30 Gm. (1 ounce) ampoule of fresh chloroform, drawn out to a capillary point, cannot be improved upon.

XV ECLAMPSIA—In the majority of instances eclampsia can be prevented by heeding the warning of the early rise of the systolic blood-pressure, taking the normal range in pregnancy from 100 to 125 systolic. Many clinics insist on hospitalization of the patient when the pressure reaches 140 systolic on 2 takings, 1 week apart, and some even at 130 systolic.

XVI ECTOPIC PREGNANCY—The mortality of ectopic gestation can be reduced only by early diagnosis and prompt surgical treatment. The factor most helpful in making a diagnosis is a history carefully taken.

XVII SURGICAL PROCEDURES IN PREGNANCY.—(a) *Appendicitis* is especially serious in the pregnant woman because increased vascularity makes perforation and peritonitis more likely,

while abortion and general sepsis increase the mortality of both mother and child. (b) *Ectopic pregnancy* must be differentiated from threatened abortion, (c) *ovarian tumors* must be differentiated from pyelitis. Prompt excision of any ovarian tumor, whenever discovered during pregnancy, is advocated. During the first 3 months of pregnancy care must be exercised not to injure the corpus luteum of pregnancy, (d) *fibroids in the cervix* obstructing the birth canal may necessitate Cesarean section. Occasionally a fibroid is so damaged by labor that necrosis and infection result, endangering the puerperium. If myomectomy has been performed, Cesarean section should be kept in mind at full term because of the danger of rupture of the uterus during labor and troublesome adhesions during the puerperium, (e) *cervical cancer*—a radical removal of the pregnant uterus followed by the use of radium and x-ray is advised.

XVIII TREATMENT OF LABOR—(1) *Infection*—Focal infection in pregnancy must be detected whether in the rectum, tonsils, teeth, sinuses, cervix or vaginal canal. Also vaginal interference in the form of intercourse, douches or vaginal examination should be minimized, (2) *Toxemia*—Eclampsia may develop without albuminuria or hypertension. Clinical symptoms often give warning, such as an altered mental condition, especially irritability, an unusual weight increase, a puffiness about the face and eyes, and a numbness and fulness of the hands and fingers.

XIX. ONE HUNDRED MATERNAL DEATHS—A study of the living children of 100 married women who died of maternal causes during 1931 has just been completed. Of these mothers, 91 were white and 9 colored. Seventy-five

were born in the United States. Seventy-two of the women had children living at the time of their deaths, an average of $2\frac{1}{2}$ children per mother or almost 2 children per woman who died. The 100 mothers who died were undelivered in 8 cases, gave birth to stillborn infants in 35, and had 58 living children. Thirty-two of the deaths followed first pregnancies, in 20 of these the woman was under 30. Adequate prenatal care had been given in 45 cases, inadequate care in 41, no care in 13, amount of care unknown in 1 case.

XX. INFECTIONS OF URINARY TRACT IN PREGNANCY AND PUERPERIUM—If preexisting nephritis and the kidney of eclampsia are excluded from the category of infections of the urinary tract, it will be found that the remaining pathological conditions such as pyelitis, cystitis and pyelonephritis are responsible for only a very small percentage of maternal mortality.

There can be no questioning the importance of this subject in pregnancy and the puerperium. Various theories have been promulgated from time to time in an effort to explain these infections, but one fact remains irrefutable, that they are infections from within which may come from the colon, through the blood stream or the lymphatics, and cannot be justly attributed to any flaw in the technic of the accoucheur, except possibly in those instances in which infection has been introduced from without by unnecessary catheterization or cystoscopic manipulation.

Bacteria are constantly being filtered out of the kidneys of many normal gravidæ. As far back as 1895, DeLee obtained streptococci from the urine of an apparently healthy gravida. Falls found colon bacteriuria in 8 of 10 pregnant women.

Weibel found the urine to be sterile in only 25 per cent of the cases. Ordinarily, *bacteriuria* would be of little consequence but because of the displacement of bladder and ureters by the ever enlarging uterus, which may produce kinking and partial obstruction of the ureters, with stagnation of urinary flow, these organisms become potentially dangerous.

Pyelitis usually manifests itself at about the fifth month of pregnancy as an acute or subacute illness. In the acute type treatment consists of rest in bed, liquid diet—fluids must be forced. Various urinary antiseptics are used, best results being obtained if they are alternated every 3 or 4 days. It is best to make the urine acid for 3 or 4 days and then render it alkaline. After the temperature subsides, the kidney pelvis should be lavaged with either sterile water or an antiseptic solution and drained by ureteral catheterization. Very few cases of *pyelitis gravidarum* recover spontaneously after delivery, and continued treatment is necessary for 3 or 4 months. If the infection continues or progresses in spite of active treatment, emptying the uterus must be considered, although an attempt should be made to wait until the child is viable.

The treatment of the subacute cases is practically the same as that of the acute, the exception being that in the mild cases confinement to bed is not always necessary and the diet can be more liberal. Kidney lavage and drainage are performed early and can be repeated oftener, if required. In persistent cases results have been obtained by the use of small doses of neosalvarsan intravenously.

Cystitis in either the acute or subacute cases is best treated by frequent irriga-

tions preferably with 1 8000 solution of silver nitrate.

Haselhorst, in a follow-up study of 62 patients who had *pyelitis* during pregnancy, attributed a fetal mortality of 10 per cent to this condition. Of the mothers, 39 had trouble sooner or later following delivery, 19 of these having a recurrence of *pyelitis* in subsequent pregnancies. He states that *pyelitis gravidarum* is not a harmless affliction which heals spontaneously after delivery. It may remain latent for many years and light up under various circumstances. Hence, women with *pyelitis gravidarum* should be carefully followed up for several months after delivery.

Fetal Mortality.—An interesting study of fetal mortality is presented by W. B. Harer from the Department of Obstetrics of the University Hospital (*Ibid* 24 254 (Aug.) 1932). A total of 230 fetal deaths occurred among 2635 consecutive deliveries in the past 2 years and 10 months. Of these, 42 were under 28 weeks of pregnancy and, because of such marked prematurity, are not analyzed in this paper. The remaining 188 cases consisted of 68 antepartum, 49 intrapartum, and 71 neonatal deaths of the fetus. There were 118 unavoidable and 70 preventable deaths. This last group of cases is probably the most important and should be the object of chief concern.

Many fetal deaths are due to causes entirely beyond the control of the obstetrician.

Vertex presentations give the lowest fetal mortality. Without regard to the method of delivery, the fetal mortality rate was nearly 5 times greater in occipitoposterior than in occipitoanterior positions.

Breech presentations portend a higher fetal mortality rate, it being nearly 3

times that of *vertex presentations* (20 per cent). Harer advises against decomposition and extraction of the breech as soon as the cervix is completely effaced and dilated, as extraction of the breech after spontaneous delivery as far as the umbilicus has given a much lower fetal mortality rate.

Compound and transverse presentations give a high rate of fetal mortality, in the present series, due chiefly to a high incidence of prolapsed cord.

All *operative procedures*, other than Cesarean section, increase fetal mortality and the earlier in labor the interference is undertaken, the greater is the danger of fetal death. The ratio of fetal deaths in low, mid, and high forceps is as 1 3 12 respectively. Cesarean section performed after long labor does not materially reduce fetal mortality. In contrast with other methods of accouchement forcé, the earlier Cesarean section is done, the lower the fetal (and maternal) morbidity and mortality.

Fetal mortality in *toxemia of pregnancy* depends upon the same factors as in nontoxemic cases plus the effect on the fetus of the toxins circulating in the maternal blood. This latter factor is so variable and so difficult to evaluate that definite conclusions are not warranted.

Although the number of cases is relatively small, the series of *abruptio placentæ* and *placenta previa* cases show that early Cesarean section gives the lowest fetal mortality of all methods of delivery.

The incidence of positive Wassermann reactions in this series of cases corresponds quite closely with that reported by Williams in 1920. The fetal mortality due to *syphilis*, however, was very much lower due undoubtedly to improved methods of treatment devised during the past 11 years.

MULTIPLE SCLEROSIS.—

ETIOLOGY.—A Weil and D A Cleveland (*Arch Neurol and Psychiat* 27.375 (Feb) 1932) have been studying the etiology of multiple sclerosis. Their attempt to repeat the work of Chevassut, who had believed certain "spheres" obtained from the spinal fluid were of etiologic significance, proved disappointing. They were, however, successful in repeating Brickner's (*Bull Neurol Inst* 1 105, 1931) demonstration of a myelolytic ferment in the plasma of patients suffering from multiple sclerosis. Brickner claims that there is a specific lipase in the blood of these patients which "is probably the same agent as the one which will produce myelinolysis in the spinal cord of rats." Weil and Cleveland, in their study of 26 cases of multiple sclerosis, likewise found a greater destructive action on the spinal cords of rats than that of normal serums, but this action could also be demonstrated in the serums from other diseases. They, therefore, hesitated to draw any conclusions as to the importance of increase in lipase in the etiology of multiple sclerosis. They found a decrease in the inorganic phosphorus in the serum of patients with multiple sclerosis as compared with normal cases and other diseases.

L A Crandall, Jr and I S Cherry (*Arch. Neurol and Psychiat* 27.367 (Feb.) 1932) found increased lipase and diastase in the plasma of patients with multiple sclerosis as compared to normals or those with diseases other than liver affections. They believe these findings signify a functional disturbance of the liver in multiple sclerosis.

PROGNOSIS.—The significance and value of the Lange gold-sol reaction in disseminated sclerosis has been studied by H J Rogers (*J. Neurol. and*

Psychopath 12 205 (Jan) 1932). From a review of the literature, together with the findings in 10 cases of multiple sclerosis which were in essential agreement, she concludes that the Lange gold-sol reaction cannot be used as a therapeutic criterion and has no real value in multiple sclerosis. It was found that 25 per cent show completely normal Lange colloidal gold-sol curves, 25 per cent show paretic curves and 50 per cent show almost every possible intermediary curve between the normal and paretic zone. No definite parallelism was found to exist between the clinical course of the disease and the spinal fluid findings. The fluid was found to alter both spontaneously and following treatment of all kinds, with and without a corresponding clinical modification.

TREATMENT.—Arising from the above etiologic studies that an abnormal lipolytic serum activity exists in multiple sclerosis that affects the myelin of the nervous system, R M Brickner (*Arch Neurol and Psychiat* 28 125 (July) 1932) studied the therapeutic efficacy of quinine, which is known to inactivate blood lipase. Knowing from theoretical considerations of multiple sclerosis that improvement can be expected only in recent lesions, he studied the early symptoms in 16 cases, giving quinine hydrochloride, 5 grains (0.3 Gm) 3 times daily, by mouth, with individual variations dependent on tolerance and effect. He found improvement in 40 symptoms (those most recently developed), while 33 symptoms of longer duration failed to respond. The author believes these results point to a specific therapeutic effect and that a trial of at least 10 months is justified.

The etiologic considerations discussed may provide the rationale of the treatment of disseminated sclerosis by liver

which was reported by A Goodall and J K Slater (Brit M J 1 789 (May 9) 1931) These authors treated 5 cases with $\frac{1}{2}$ pound (240 Gm) of liver daily with good results observed over a period of 7 months Since all cases responded well to treatment, they believe these results cannot be considered to be remissions despite the short interval The suggestion that multiple sclerosis is a deficiency disease is offered

MYELOMA, MULTIPLE.—

This condition is rarely observed, according to W A Jones (Canad M A. J 27 595 (Dec) 1932), in young persons, and occurs 3 times in every 1000 cases of all types of malignancy The histogenesis has been attributed by some to the plasma-cell and by others to the myelocytic cells Williams recently favors the osteoblast as the possible cell of origin

Rheumatic pains are observed at the onset Sometimes a pathologic fracture first brings the patient In the absence

of the latter, the x-rays will show rarefaction of the bone Remissions in the pain may occur for months The final stages are characterized by considerable severe pain

The tumors are usually multiple and commonest in the ribs, sternum, clavicle and spine The x-rays show rarefaction in the form of punched-out areas and mottling of the shadows Deformity of the bones may also be seen Bronchitis, emphysema, pleurisy and subpleural nodules are common complications. Nephritis is seen in many cases and about 72 per cent show Bence-Jones proteins in the urine

The blood picture is one of anemia with a leukopenia or leukocytosis Metastasis to the various internal organs is common in this condition The case is reported of a man, 48 years of age, with a multiple myeloma of the right shoulder, in which the use of x-ray definitely retarded and caused regression of the growth of the lesions where the applications could be made

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NEPHRITIS.—PATHOLOGY.—

In a comprehensive discussion of the relation of lipoid nephrosis to nephritis, E T Bell (Ann Int Med 6 167 (Aug) 1932) states that there are 2 definite and distinct forms of chronic glomerulonephritis, *ie*, (1) an azotemic type characterized by nitrogen retention, and (2) an *hydropic* or *nephrotic type* characterized by marked edema and albuminuria.

The hydropic type, frequently called lipoid nephrosis, is often subdivided into pure lipoid nephrosis and a mixed type (nephritis with a nephrotic component) The pure differs from the mixed type

in the absence of hematuria, hypertension and impaired kidney function.

According to Bell, edema is a general feature of nephritis and there is no basis for the belief that every nephritis with edema has a nephrotic component He also states that if nephrosis is a distinct entity, nearly all cases of nephrosis have a nephritic component

Where there is a mixed type of lipoid nephrosis there is a marked thickening of the capillary basement membrane in the glomeruli and a variable amount of endothelial proliferation

The theory is proposed that the urinary disturbance in both nephrosis and

nephritis is an injury of the glomerular capillaries by some toxic substance. If little or no reaction occurs in the capillaries, the clinical picture of a pure nephrosis develops, while a moderate reaction results in those symptoms which are observed in nephritis, while a marked reaction gives the clinical picture of a severe nephritis.

The clinical picture depends to a large extent upon the character of the injury in the glomerular capillaries. When they are open and consequently allow albumin to escape in large quantities, nephrosis develops. When, on the other hand, they are narrowed and occluded, with obstruction to the outflow of albumin, there is hypertension and a retention of nitrogen.

Studying the correlation of clinical manifestations and pathologic changes in nephritis, J. P. Simonds (Illinois M J 61 201 (Mar) 1932) believes that for practical purposes, both clinical and pathologic, nephritis can be conveniently divided into 2 main groups, *i e*, the cases in which the damage is to the secretory portion of the kidneys and those in which the damage is to the smaller arteries and arterioles. Cases of the former may be chronic, subacute or acute, but those of the latter class are usually always chronic and include the so-called interstitial nephritis and arteriosclerotic primary and genuine contracted kidneys.

In this first type there is no retention of the waste products in the blood or of dye in renal function tests, but a retention of crystalloids in the tissue with resultant edema. In the second type, the function is impaired as a result of the disturbance in the circulation through the arterioles, with reduction in the blood volume and blood-pressure. A compensatory increased general blood-

pressure occurs, but there is gradual retention of waste products.

A. P. Briggs (Arch Int Med 49 56 (Jan) 1932) studied the acid-base equilibrium in a group of nephritic patients in whom vomiting and other complications were negligible. The serum acids were found similar to those where ligation of the ureters was performed in experimental animals. There was, however, a slight depression in the level of serum fixed base. Prolonged administration of mineral acid to these nephritic patients (without edema) led to a waste of more base than in normal controls. The conclusion is drawn that the defect in conservation of base, as well as water, chloride and other substances, depends largely on an increased rate of flow of the glomerular fluid through the surviving tubules. He also concludes that the chief function of the ammonia formation is the prevention of excess acidity in the genitourinary tract.

TREATMENT.—Treatment of the 2 types of nephritis are different, according to Simonds (*loc cit*). In the *first type* a high protein diet should aid in the restoration of the depleted serum albumin. Reduction of the water intake and of salt should aid in relieving the edema. In the *second type* a low protein diet is indicated with a normal or adequate amount of water to flush out the waste products.

A series of 17 cases of *chronic* nephritis have been studied by D. M. Lyon, D. M. Dunlap, and C. P. Stewart (Lancet 2 1009 (Nov 7) 1931) in which it was found a basic type of diet was better tolerated by such patients than an acidic type. According to the author, the deleterious effect of an acidic diet may be counteracted by the simple administration of adequate doses of alkali. In advanced cases it is usually neces-

sary to supplement even a **basic diet** with **alkaline salts** in order to maintain an alkaline urine. The beneficial effect of this diet seems to be due to its alkalinity entirely, and this reaction does not act by reducing the absorption of protein or by decreasing the rate of breakdown of the body proteins.

Surgical Treatment.—During the past few years there has been an increased attempt on the part of urologists to cure definite types of nephritis by operation and there is no question but that many cases can be helped by some form of surgical treatment. Certainly the medical treatment of nephritis has not been so successful.

I Simons (J Urol 27 399 (Apr) 1932) reviews all of the various classifications of *nephritis* and the surgical attempts made to help cure these conditions. He reviews the classifications of Volhard and offers the surgical treatment therefor. In *acute Bright's disease* the treatment is decapsulation or nephrotomy with removal of the foci of infection; in *acute diffuse glomerulonephritis*, decapsulation or nephrotomy; in *embolic focal purulent nephritis*, nephrectomy, partial or complete and simple drainage. He considers bilateral septic infarcts and ascending pyelonephritis as nonsurgical. In *chronic Bright's disease* he considers decapsulation questionable and in another classification, *nephritic massive hemorrhage* and *chronic nephritic nephralgia*, he suggests nephrotomy and partial decapsulation. The following symptoms in selected cases must be kept in the foreground: (a) severe renal pain, (b) massive renal hemorrhage; (c) the oliguria-anuria-uremia complex, and (d) the preceding associated with anasarca. He insists upon complete urological study. The entire literature

on the treatment of renal infections by surgical methods is reviewed and 15 personal cases are added.

NEPHRITIS IN CHILDREN.—

Etiology.—In a study of the etiological factors which may be operative in nephrosclerosis in childhood, A. G. Mitchell and G. M. Guest (Tr Sect Dis Child A M A p 103, 1931) conclude that there is a familial and an hereditary predisposition to it, that intrauterine nephritis or nephritis in very early life may occur, that syphilis has little, if any, effect in causing chronic kidney diseases in early life, that acute bacterial infections, especially of a streptococcic nature, may cause injury to the kidney, resulting in chronic diseases, that exogenous and endogenous poisons and toxins are seldom etiologic factors, that focal infections seem to have little to do in the causation of chronic kidney disease in childhood, that high protein diets are not operative in producing nephritis in early life. Congenital anomalies of the urinary tract seem to be an important factor in the causation of these cases of nephrosis which are diagnosed in infancy and early life and particularly in those cases which show bony changes.

The possibility that *lead poisoning* in early childhood is a cause of chronic nephritis and dwarfism is suggested from the observations of L. J. Jarvis Nye (M J Australia 2:813 (Dec 26) 1931). His deductions are based on the study of 22 patients. Except for dwarfism and the signs of chronic interstitial nephritis, these "saturnine renal dwarfs" differ from patients with renal rickets in that they have all the signs of generalized vascular sclerosis with elevated blood-pressure and cardiac hypertrophy, normal mentality, normal

secondary sexual characteristics and no gross bony changes

Diagnosis.—Function Tests—A set of normal standards for the urinary excretion of formed elements in the adult has been established by T Addis W B Rew and A. B Butler (J Pediat 1 216 (Aug) 1932) have attempted the problem of establishing a similar set of "normals" for children, as well as an evaluation of the method in children with (1) acute infections, (2) dehydration, and (3) nephritis. A comparison of their results in normal children with those of Addis and of Goldring in adults is illustrated in the table, which is taken from their article

repeated examinations indicates progression of the lesion

Treatment—The administration of a high protein diet to patients with chronic nephritis with edema or so-called nephritis has been advocated by a great number of writers. However, it is common practice to restrict the protein intake during the acute stage of hemorrhagic nephritis and in the diets of patients with nephrosclerosis. That this is not only unnecessary but may actually be harmful is apparent from recent observations. J S McLester (J A M A 99 192 (July 16) 1932), on the basis of Van Slyke's statement that "in acute hemorrhagic nephritis the

Group	Sex	No of Cases	12-hour Urine Volume	Sp G of Urine	Red Blood Cells, Thousands	White Blood and Epithelial Cells, Thousands	Casts, Thousands
Upper limits, normal girls	F.	8	238	1 037	274 0	4106 0	34 0
Upper limits, normal boys	M	8	178	1 032	157 0	840 0	37 8
Upper limits, normal (Addis)	M	74			425 0	1835 0	4 27
Upper limits, normal (Goldring)	M	45			1530 0	3400 0	9 2

They also report a modification of the method for the differentiation of red and white blood cells in the urinary sediment. Brilliant cresyl blue was used as a staining medium. By this procedure the white cells were stained varying shades of blue, while the erythrocytes appeared a yellowish green.

The advantage of the so-called Addis sediment count is supposed to be in the comparative information which is obtained from repeated examinations over a period of time. Excretion of formed elements in amounts distinctly greater than "normal" is supposed to be due to renal pathology; a progressive increase in the numbers of excreted elements in

prognosis was found to be independent of the severity of the disturbance during the first weeks with the single exception of the plasma albumin content; the majority of cases in which this fell to a low level became chronic," says it would seem that the chances for recovery from acute hemorrhagic nephritis would depend largely on the ability to compensate for the protein loss. W S McCann (Ann Int Med 5 579 (Nov) 1931) reports the instance of a young boy with acute hemorrhagic nephritis whose disease was at a standstill while he was receiving 75 grams of protein per day, and who showed marked and immediate improvement

when his protein intake was increased to 150 grams per day. McLester suggests the giving of 150 grams of protein daily to adults with *acute hemorrhagic nephritis* and 75 to 100 grams daily to adults with *chronic nephrosclerosis*. If this generous protein intake is advantageous for the adult patient with nephritis, it seems logical to deduce that the need of the nephritic child is even relatively greater, because of the normally greater demand of the growing organism for protein.

HEMORRHAGIC.—Etiology.—What is termed a familial epidemic of *acute diffuse glomerulonephritis* is described by A. C. Ernstene and G. P. Robb (J. A. M. A. 97: 1382 (Nov. 7) 1931). Of 10 children in one family, 8 successively developed an acute non-scarlatinal upper respiratory infection. Six of them developed an acute diffuse glomerulonephritis from 7 to 10± days following the onset of the respiratory infection. The authors believe that the interval elapsing in each case between the onset of the acute infection and the appearance of nephritis supports the hypothesis that acute diffuse glomerulonephritis results from the development of a state of hypersensitiveness to the primary infection.

Treatment.—In severe acute hemorrhagic nephritis, so-called "uremic" or cerebral symptoms, such as vomiting, headache, visual disturbances, frequently a slowing of the heart and respiratory rates, coma, convulsions and, if untreated, death, are not uncommon. However, it has been amply demonstrated that treatment may be successful, in the majority of instances, if it is properly carried out and instigated sufficiently early after the onset of the cerebral symptoms. An adequate plan of treatment has been outlined by K. D.

Blackfan and C. F. McKhann (Tr. Sect. Dis. Child. A. M. A. p. 120, 1931). In their estimation **magnesium sulphate** is the most valuable of the various therapeutic agents which have been used. They recommend the administration of large amounts of a 50 per cent solution (1 to 2 ounces—30 to 60 cc—every 4 hours) by mouth or by rectum in the precomatose stage. The medication should be continued until the blood-pressure approaches a normal level.

Formerly, Blackfan had recommended the intravenous injection of a 1 per cent solution of anhydrous magnesium sulphate in comatose patients or in those with convulsive twitchings. About 10 cc (2½ drams) per kilo (2½ pounds) bodyweight was given. The injection was made slowly (3 to 4 cc—¾ to 1 dram—per min.) by the gravity method, and the blood-pressure was constantly recorded from the opposite arm. If signs of respiratory depression appeared, the injection was stopped temporarily. If the depression became alarming, the injection was discontinued and 2 to 5 per cent calcium chloride was injected parenterally.

More recently, the authors have observed that the *intramuscular injection* of a 25 per cent solution of magnesium sulphate has almost as prompt an effect in relieving cerebral symptoms and in reducing blood-pressure as the intravenous injection of a 1 per cent. solution. They advise the use of 0.2 cc (3 minims) of the 25 per cent. solution per kilo (2½ pounds) bodyweight. In exceptional instances as much as 0.4 cc (6 minims) per kilo bodyweight may be administered. The effect is measured by fall in blood-pressure and diminution in cerebral symptoms and is usually manifest within 15 to 30 min-

utes If there is no effect from the first intramuscular injection, a second may be made with relative safety within 2 or 3 hours A return of cerebral symptoms indicates repetition of the therapy The authors counsel that intravenous and intramuscular injections are merely emergency measures and should not take the place of the dehydrating effect of magnesium sulphate when administered by mouth or by rectum

In addition to the use of magnesium sulphate in the treatment of cerebral manifestations, R M Pollitzer (Arch Pediat 49 463 (July) 1932) advises the forcing of fluids by mouth even in the presence of edema and oliguria He cites his own experiences as well as that of C A Aldrich (Am J Dis Child 41 1265 (June) 1931) in justification of this plan of treatment

NEPHROSIS. — Pathogenesis. — By means of dialysis experiments, L J Del Baere (Nederl tijdschr v geneesk 75 3694 (July 11) 1931) has shown that in nephrosis the most easily diffusible proteins have passed from the blood into the urine Because of this observation he believes that the cause of the albuminuria is an increased permeability of the kidneys, and, further, that these changes in the serum protein are instrumental in the production of edema

E Coelho and J Rocheta (Presse méd 39.1875 (Dec 19) 1931) have treated a number of cases of nephrosis with thyroid extract without improvement They were also unable to produce nephrosis experimentally in dogs by means of thyroidectomy

Carbohydrate metabolism in patients with *lipoid nephrosis* has not been studied extensively According to R H Major and C J Weber (Proc Soc

Exper Biol and Med 29 603 (Feb) 1932), previous observations have not disclosed any deviation from the normal In contrast, they found atypical glucose tolerance curves in each of 4 patients with typical lipoid nephrosis In no instance did the blood level rise above 0.10 gram per 100 c.c. after the administration of 1.5 or 3 grams of glucose per kilo bodyweight The characteristic sharp peak and rapid fall of the normal curve was not present in any instance These patients were then placed upon a high carbohydrate diet and treated with diuretics Marked clinical improvement followed and the glucose tests were repeated This time, after the ingestion of 1.5 gram of glucose per kilo bodyweight, typical normal tolerance curves were obtained The authors do not feel that there is any basis for associating this abnormal glucose tolerance with thyroid deficiency in their cases

A R Kantrowitz and P Klemperer (Virchow's Arch f Path Anat 280 554 (March) 1931), using Bell's technique, examined the kidneys in 2 cases of *lipoid nephrosis* They could not detect any inflammatory changes in the glomeruli They suggest, that the enlargement of the endothelial cells of the glomeruli which Bell attributed to an inflammatory process could be explained by the deposition of lipoid material, which is not specific for lipoid nephrosis

NEPHROLITHIASIS. — Etiology — G Marion and P Abram (J d'urol 32 252, 1931) report the fact that either the renal lithiasis or the infection may be the primary or secondary factor in the origin Any infection causing an alkalinity of the urine brings about a precipitation of the ammonium and magnesium phosphates, but where

colon bacilli affecting the acidity of the urine, are present, the calcium oxalate crystals form

Two personal cases of *bacterial concretions* in the renal pelvis are reported by A J Scholl (Surg Gynec Obst 55 360 (Sept) 1932) These concretions were composed of *Bacillus coli*, and he believes that continuous infection of the kidney seems necessary for these peculiar calculi to be developed They usually are of less density than the pyelographic media and **nephrectomy** seems to be the only possible measure available if they are unilateral They may also occur concomitantly with the usual types of renal calculus

F Oehlecker (Zentralbl f Chir 59 1264 (May 21) 1932) reports a case of a man, 45 years of age, in which the renal calculi were of *traumatic* origin The patient fell a great distance with injury to the long bones and fracture of the third lumbar vertebra, with avulsion of the transverse processes of the lumbar vertebræ Hematuria developed but nothing else for 3 months At this time severe manifestations of nephrolithiasis and pyelonephritis appeared Bilateral stones were revealed by roentgenograms X-rays made immediately following the injury gave no evidence or suspicion of the presence of a stone on either side Thus the author believes it cannot be doubted that these stones were of traumatic origin He also believes that the fibrin floccules acted as centers and eliminated calcium salts, effected a precipitation of colloids and crystalloids and thus calculi were formed

I Mikalovici (J d'urol 32 305, 1931) reports that a pyelitis associated with an acute gonorrheal urethritis is not rare He believes the stages of formation of stones are as follows.

(1) the formation of a nucleus of cells, bacteria or fibrin, (2) a spheroid deposit of urinary salts brought about by changes in the colloids of the urine, (3) retention, and (4) stone formation In the absence of retention according to the author, the precipitated salts are excreted as sand

SYMPTOMS.—Symptomatically Marion and Abram (loc cit) divide cases of renal calculus with infection into 2 types In one type there is pain in the kidney region with more or less hematuria which is usually prolonged, while in the second type the symptoms are chills, fever, poor general condition and pyuria

DIAGNOSIS is usually made by x-ray Marion and Abram (loc cit) believe this procedure is also to be used in all cases of pyuria, with or without fever, in which tuberculosis cannot be demonstrated.

S J Waterworth (J Urol 28:77 (July) 1932) reports a case which is interesting from 2 points of view, *ie*, (1) a large renal calculus was removed from the right kidney, the diameter of which was 1.45 cm, and (2) its weight was 1100 grams or 2.42 pounds It was present 28 years without causing disability or symptoms However, the irregularity of its presence over such a long period of time resulted in the development of an epithelioma of the pelvis of the kidney, which recurred following operation, and resulted in death

DIFFERENTIAL DIAGNOSIS.—B Lewis (Urol and Cutan Rev. 36 392 (June) 1932) calls attention to *renal colic caused by urinary regurgitation* The diagnosis is very often mistaken for calculus disease and he considers the causative factor of the regurgitation as a well-defined obstruction at the neck of the bladder Relief

of the obstruction seems to cure the condition

B Lewis (J A M A 98 609 (Feb 20) 1932) states it was formerly believed that the normal ureteral valve prevented the *regurgitation of urine* from the bladder to the ureter. Animal experimentation seemed to prove this contention, but clinical observation found it wanting. Of 1039 cystograms studied by Bumpus, regurgitation into one or both ureters was found in 89. In some of these cases the regurgitation was due to back-pressure and in some to incompetent valve action.

It seems, under proper conditions of tonicity and pressure on the filled or semifilled bladder, that urine or fluid flows through the normal or intact orifice back into the ureter and even up into the renal pelvis. From this it is possible, according to the author, to explain the frequency of ascending infections from the bladder to the kidney. In many instances the ureteral colic experienced in prostatic and urethral obstruction may be explained upon this basis. Lewis looks for considerable assistance in the study of renal colic by regurgitation from the intravenous pyelography.

RECURRENCE.—According to Marion and Abram (loc cit), removal of the stone does not always overcome the infection. After *pyelotomy*, recurrence develops in 17 per cent of cases without infection and in 75 per cent. with infection. After *nephrotomy* the incidence of recurrence in infected cases may be as high as 41 per cent. This is due to the fact that *pyelotomy* is performed for small stones, while *nephrotomy* is done where the stone is deep in the kidney more.

A very interesting case of recurrent calculi in a solitary kidney was

observed by H L Low (Urol and Cutan Rev 36 96 (Feb) 1932). The case showed that the calculi passed were cystin stones, none of them being visible on the x-ray. Many stones have been passed since 1926 and the patient has had considerable treatment. Despite this, however, the solitary kidney is of good function. Infected teeth have been removed, foci of infection have been searched for and eliminated, and many of the stones have had to be assisted in their passage. Treatment seems to be of little avail, except in helping to pass the stones. No operative treatment has been attempted. No treatment seems to stop the incidence of the stones and the kidney, even though badly handicapped, functions very well.

TREATMENT.—Although the infected renal calculi predispose to kidney damage, such a kidney may be carried along for years without surgery, according to Marion and Abram (loc cit). If a stone has destroyed one kidney and the other is normal, a *nephrectomy* may be done. Surgery is also indicated if the stone is amenable to *pyelotomy*. Drainage of the pelvis often eliminates the danger of recurrent stone formation.

V H Carson (U S Nav M Bull 30 185 (Apr) 1932) submits data on 46 patients upon whom 55 operations, under spinal anesthesia, were performed for calculi. He believes *pyelotomy* to be the choice as it lessens the chance of a recurrence as compared with *nephrotomy*. Indications for the operation are diminished function, urinary obstruction, infection, persistent hematuria and pain. When *nephrolithotomy* has been performed in the presence of a heavy infection, observation has shown that a loss of function with recurrence almost surely follows.

E L Pearson, Jr (New England J Med 206 1243 (June 16) 1932) believes unsatisfactory surgery is due to the delay in operation. His procedure is to obtain a urinalysis and x-ray examination of every patient. If a stone is discovered, he performs a **cystoscopy** and follows the patient until the stone is removed. An operation is indicated upon the first appearance of signs of infection or increasing kidney damage. He considers expectant treatment only when thorough examination has been performed and he has the assurance that his patient will be continually under the most rigid medical supervision.

A Jacobs (Brit M J 1 513 (Mar 19) 1932) advises surgery except in a few cases. He believes the infections will eventually destroy the function of the kidney and a stone predisposes to squamous cell carcinoma of the pelvis.

Edmond Papin (Arch d mal d reins 6 493, 1932) urges the seriousness of radical operations in calculus disease. He believes **pyelotomy** to be safe. At times he does **nephrotomy** and urges radical **nephrectomy** only after careful complete study reveals the possibility of recurrence to be almost a certainty.

NEWBORN, DISORDERS OF. —PREMATURITY.—*X-ray Find-*

ings.—In order to study the x-ray appearances of the chest of the normal premature infant, C A Weymuller, A L L Bell and A A Trivilino (Am J Dis Child 43 585 (March) 1932) have made daily x-ray examinations of 15 normal premature infants during the first 14 days of life. The findings were in the main those of full term infants except that the pulmonary fields, hilum and peribronchial trunks were much less dense and the peribronchial shadows

were more delicate in structure. The smaller the baby, the clearer were the x-ray pictures. The interlobar pleural line, which is so commonly seen in full term infants, was observed in only 1 instance and that in one of the larger babies. The heart shadows tended to decrease in size after the second day, as in the full term infant, although 3 remained unaltered in size during the 14-day period.

Treatment.—One of the problems in the handling of premature infants, who have been cared for in the free hospital ward, is the securing of adequate home care following the hospital discharge. M W Poole and T B Cooley (J Pediat 1 16 (July) 1932) found that only a few of the premature infants who were discharged from their hospital service in 1928 and 1929 were living in January, 1930. It was assumed that this was due to inadequate and improper home care. In order to improve these conditions as well as to shorten the length of the hospital stay and thus decrease the hospital expense, 2 visiting nurses were employed to supervise the home care. Immediately after the baby's arrival at the hospital, the education of the mother begins. This includes, at first, instruction in expressing milk from the breast, proper handling of the milk and dietary instruction, as well as breast massage, in order to stimulate milk secretion. Before the baby is dismissed from the hospital, the mother is instructed (in the ward) in the handling of the infant. This includes bathing, feeding and, if the baby is not breast-fed, preparation of the formula. Home instruction includes advice regarding the type of cot or bassinet, its placing so as to avoid drafts, the proper temperature and humidity of rooms and the necessity for strict isola-

tion After the hospital dismissal frequent home visits are made by the nurse, averaging 6 calls during the first week, 3 during the second, 2 during the third and fourth and then once weekly as long as it seems necessary Frequent check-ups are also made at the out-patient dispensary Seventy premature infants have been cared for by this method with improved results In the 12 months prior to the publication of this article, 38 infants were discharged with only 2 readmissions and with no deaths in the homes

From their observations and study of these patients during the past 2 years, the authors have drawn the following conclusions

1 Supervised home care of premature infants is satisfactory

2 Rickets is preventable in premature infants if cod-liver oil and ultraviolet irradiations are started early

3 Breast milk with added calcium caseinate (2 per cent) is a satisfactory feeding for infants under 1400 grams in weight

4 Diluted, unsweetened evaporated milk with added carbohydrate can gradually be substituted for the breast milk in infants weighing more than 1400 grams and nonacidified evaporated milk is satisfactory for larger prematures and during the period of home-care

5 Gastrointestinal upsets are of infrequent occurrence in infants who are free from infection

A *simplified feeding technic* for small premature infants has been described by L W Sauer (Am J Dis Child 44 106 (July) 1932) To the lower end of a long dropper or eye pipette is attached a piece of soft rubber tubing 8 cm (3 inches) long and 5 mm ($\frac{1}{8}$ inch) in diameter The attendant, sit-

ting beside the crib, steadies the infant's head with the left hand, and inserts the filled pipette (40 to 60 drops of warm, pasteurized breast milk) at the side of the infant's mouth, passing it back to the base of the tongue When the tip of the tube has reached the posterior pharyngeal wall the pipette is emptied by gentle pressure on the bulb The first feeding is given from 4 to 6 hours after birth and consists of a few drams of sterile diluted breast milk Feedings are given at 3- to 4-hour intervals By gradually increasing the amount and the strength of the milk, 7 or 8 feedings consisting of 1 ounce (30 cc) of breast milk are given within the 24-hour period to most prematures Feeding can be completed in less than 10 minutes The author claims that this procedure is not only simpler and less time-consuming than gavage, but that it is safer and requires less skill on the part of the nurse or mother

INTRACRANIAL HEMORRHAGE—*Pathogenesis*—According to C R Tuthill (Arch Neurol and Psychiat 26 268 (Aug) 1931), the elastic layer of the cerebral blood-vessels is not well developed at the time of birth He believes that this lack of development may account for the ease with which intracranial hemorrhage occurs in the newborn

Pathology—H G Creutzfeldt and A Peiper (Monatschr f Kinderh 52 24 (Feb 23) 1932) describe the results of the histologic examination of the brains of 7 premature infants, all of whom had shown before death serious respiratory disturbances Six revealed no hemorrhages whatever in the brain stem, and in the seventh child there were small extravasations without reactions of the surrounding tissues, i e., so-called agonal hemorrhages In this case there

also was a slight hemorrhage from the right vena terminalis. These observations contradict the assumption of Ylppo, of Schwartz, and of others who believed that the fatal respiratory disturbances in premature infants must be the result of cerebral hemorrhages. On the contrary, the observations prove that death is only the result of the immaturity of the central nervous system and of the resulting weakness of the respiratory center.

Diagnosis—W. Catel (*Ibid* 52:1 (Feb 23) 1932) claims that with the aid of the simultaneous quantitative determination of bilirubin in the serum and in the cerebrospinal fluid, it is possible to diagnose intracranial injuries received during birth while the child is still alive. Although the number of cases in which this was possible is as yet not large, the method has the advantage that it is based on a reliable foundation. Observation proved that, even when the course of birth is normal, intracranial hemorrhages are comparatively frequent, but symptoms in the form of a lack of vitality are present only in about one-half of these cases. In spite of the fact that a first birth and a pathologic course of the birth (use of forceps or breech presentation) favor the development of birth injuries, the author considers it as not permissible to conclude from the birth anamnesis alone the presence or absence of a birth trauma. In a child that has been delivered by means of forceps or from a breech presentation and that later shows symptoms of Little's disease or of imbecility, it is not right to assume without reservation a causal relation between the two factors, as is often done by pediatricians and neurologists. The author admits that extensive intracranial injuries sustained dur-

ing birth may be a direct cause of death or may lead to cerebral injuries that become manifest at a later date, but on the basis of his observations he considers it as out of the question that the birth trauma has significance as a cause of death or as a cause of late central nervous disorders which have been ascribed to it in recent years. Postmortem examinations revealed that in 66 per cent of the children death was a direct result of birth trauma, and after-examinations in children who were severely injured during birth showed that the further development was generally unimpaired.

Prophylaxis and Treatment—The early treatment of *intracranial hemorrhage* in the newborn is outlined by I. N. Kugelmass (*M. Clin. North America* 15:1313 (Mar) 1932). If the infant is cyanotic, or if there are respiratory disturbances, it should be placed in an oxygen tent or in a Drinker box-respirator. For *asphyxia* or other conditions indicative of increased intracranial pressure, *cisternal puncture* should be performed immediately after birth, and repeated daily if necessary. Immediately after resuscitation, 15 cc ($\frac{1}{2}$ ounce) of whole blood should be injected into each buttock, and repeated daily until the clotting and bleeding times are each reduced to 5 minutes. A solution of 3 per cent gelatin, 5 per cent dextrose, and 0.5 per cent sodium chloride should be given every hour through a Breck feeder, in order to combat shock and supply fluid and food. After the second day, a thick milk feeding (evaporated milk, 12 ounces (360 cc), water, 18 ounces (540 cc), barley flour, 3 ounces (90 cc)) may be given every 4 hours. Unnecessary handling should be avoided. If *convulsions* are not controlled by

spinal drainage, sodium amytal, 1 grain (0.065 Gm) in aqueous solution or 1 per cent magnesium sulphate may be given by rectum

HEMORRHAGIC DISEASES.—

Pathogenesis.—A study of the substances involved in the coagulation of the blood has been made in newly-born infants by H N Sanford, T H Gasteyer, and L Wyatt (*Am J Dis Child* 43 58 (Jan) 1932). According to their findings, the amounts of the blood-clotting elements in the blood of the average newborn are in favor of increased coagulability. They conclude that abnormal factors must be operative if spontaneous hemorrhage occurs within the first few days of life.

Diagnosis.—Recovery of a case of *suprarenal hemorrhage* in a newly-born infant is reported by J Rosenblum (*Ibid* 43 663 (Mar.) 1932). The diagnosis was based on what is considered to be the characteristic syndrome consisting of high temperature, rapid respiration (without pulmonary pathology) and a palpable abdominal tumor. A blood sugar of 63 mg per 100 c.c. of blood and a urea nitrogen of 30 mg per 100 c.c. were considered to be confirmatory evidence in this case.

Treatment.—In a subsequent report, Sanford, Gasteyer and Wyatt (*Ibid* 43 566 (Mar) 1932) show that ultraviolet radiations or the administration of viosterol 250 D, or both, tend to slightly increase the fibrinogen content and to decrease the antithrombin of the blood in the newborn, thus increasing the tendency of the blood to clot. In another study, H N. Sanford, H J Morrison and L Wyatt (*Ibid* 43 569 (Mar) 1932) observed the effect upon the blood coagulation substances of withholding protein and fat from the diet of newly-born infants for the first

5 days of life. It was found that the blood fibrinogen was reduced and resulted in a decreased ability of the blood to coagulate.

ICTERUS — Pathogenesis.—A study of so-called physiologic icterus in the newborn has been made by P Lereboullet, J J Gournay and J Detrois (*Nourrisson* 19 356 (Nov) 1931). The van den Bergh reaction was indirect in all instances and averaged 9 units. The red cell count was above normal. The fragility of the red cells was either normal or there was an increased resistance. In 5 instances there was no urobilin or urobilinogen in the urine and only traces in 6 other cases.

The authors suggest that before birth the excess bile pigment is excreted through the placental circulation and that when this exit is closed at the time of birth, the liver function is inadequate to secrete the pigment. The excessive destruction of red cells which occurs shortly after birth is believed to be a contributing factor. The absence of choluria is believed to be due to inability of the kidneys to excrete bile during the first few days of life. When the liver and kidneys assume their regular functions, the icterus disappears.

ASPHYXIA NEONATORUM.—

Pathology.—That the primary chemical blood change in asphyxia neonatorum is a reduction in the oxygen content of the fetal blood is apparent from the work of N J Eastman (*Bull Johns Hopkins Hosp* 50 39 (Jan) 1932), the oxygen content of the fetal blood falling below 1 volume per cent in fatal cases. The normally elevated carbon dioxide tension of the mixed fetal blood supplying the brain of the fetus is difficult to reconcile with the apneic state of the fetus in utero and at present necessitates the assumption that the sen-

sitivity of the fetal respiratory center in respect to carbon dioxide at least, is definitely depressed. In severe asphyxia neonatorum, the carbon dioxide content of the blood is slightly lowered as a result of the displacement of this gas from base by the large amounts of lactic acid present. The serum pH of asphyxiated infants is reduced to the lower limits compatible with life, and in fatal cases may even fall below 7. From these observations the author concludes that the use of carbon dioxide as a resuscitating agent in asphyxia neonatorum

J Dis Child 43 594 (Mar 1932). Attention is called to the inconstancy of the symptoms and physical signs. Cyanosis is the chief symptom and may be constant or intermittent. Such other symptoms as a weak cry, rapid, shallow, irregular breathing and cough, may or may not be present. Abnormal physical signs are not always present. It may not be possible to detect the characteristic fine crepitant rales because of the shallow respiration. The percussion note is impaired and breath sounds are abnormal only when fairly extensive lung



A, unaerated lungs of a stillborn infant. Note cone-shaped thorax, concave borders of chest and acute angle that ribs form with spine. *B*, inflated lungs of stillborn infant. Note clarity of lung fields, more convex borders of chest and elevation of ribs to more nearly a right angle with spine. (E. C. Dunham, Amer J Dis Children.)

torum is not only superfluous, but may even be harmful in that it tends to aggravate an already existing acidosis. Attempts at physical stimulation, as for example by slapping and immersion, may also be deleterious. The chief need seems to be for oxygen (or air) and the method of its administration is of secondary importance so long as the air passages are clear and the pulmonary alveoli are supplied with adequate amounts of this gas.

ATELECTASIS.—*Diagnosis.*—The importance of the x-rays in the diagnosis of atelectasis in the newborn is emphasized by E. C. Dunham (Am

areas are atelectatic. The x-rays are a satisfactory means for differentiating the cyanosis due to atelectasis from that caused by other conditions. The picture is characterized by haziness of the lung fields, which is evidence of incomplete aeration, and by the abnormal shape of the thorax (see Illustration) and the abnormal position of the ribs, which are evidence of incomplete lung expansion.

PEMPHIGUS NEONATORUM.—True nonsyphilitic bullous impetigo, in which the bullæ are present at the time of birth, is not common. C. D. Freeman (Arch Dermat and Syph 24:

1058 (Dec) 1931) reports 2 such cases and reviews the previous literature. It is generally considered that the streptococcus is probably the causative agent, with the staphylococcus playing a secondary rôle. The source of the infection can only be conjectured since the mother is usually not clinically ill. However, it is apparent that children may be born with lesions which are identical with the impetigo neonatorum which develops after birth, and that this infection may be a source of contagion to others.

Treatment.—Such an experience is recorded by I. Rubell (Arch. Pediat. 48:777 (Dec) 1931). Three cases of congenital impetigo were reported, the first of which was responsible for the start of an epidemic in Mt. Sinai Hospital, Chicago. From his experience, the author concludes that the important factor is the handling of these children so that the spread of the infection to other infants is prevented. The majority of cases of impetigo of the newborn respond readily to local treatment, so that the choice of therapeutic agents seems of little importance. Antiseptic ointments of various kinds, lotions, dusting powders, gentian violet and ultraviolet irradiations have all been used successfully. In this series, the lesions were opened as soon as discovered, touched up with 95 per cent alcohol, and 2 per cent ammoniated mercury then applied. The most important prophylactic measures were strict isolation, separate nurses for infected nurseries, no admission to the nursery except to nurses and doctors, and then only under careful isolation technic, and, in particular, the proper handling of the nursery linen and avoidance of overcrowding the nursery at any time.

OPHTHALMIA NEONATORUM.—The importance of the prevention of infectious eye lesions in the newborn is evident from the report of A. B. Ingels (Rhode Island M. J. 15:43 (Mar) 1932). From January 1, 1925, to October 27, 1931, 118 such cases were reported to the Rhode Island State Health Commission. In 13 per cent there was total or partial loss of vision. Other organisms than the gonococcus, which were operative, were the Koch-Weeks bacillus, the pneumococcus, the colon bacillus, *Bacillus xerosis*, staphylococcus and streptococcus. Four reasons for failure in prevention were given: (1) failure to instill 1 per cent silver nitrate solution, (2) improper technic of instillation, (3) use of solutions decomposed by light or organic matter, and (4) use of solutions not standardized, or made from untried germicides.

DUODENAL OBSTRUCTION.—Congenital obstruction of the duodenum is due to faulty embryologic development. A review of this subject is made by W. E. Ladd (New England J. Med. 206:277 (Feb 11) 1932). There are 2 types, the intrinsic or intramural and the extrinsic or extramural. In the former, the obstruction is produced by residual septa within the lumen of the gut. In the latter type, there is an incomplete rotation of the intestine, the obstruction being caused by extraduodenal pressure. In complete atresia the most characteristic symptom is vomiting of the explosive type beginning shortly after birth. If the obstruction is not complete, the symptoms may not be constant and may not begin until some time after birth, and may even be compatible with life for some time. In addition to the intermittent vomiting, epigastric distension and gastric peristalsis are also present.

The records of only 10 successfully treated cases could be found in the literature. The author adds 10 cases of his own. Among the successful operative procedures were posterior gastrojejunostomy, posterior duodenojejunostomy, reduction of mid-gut volvulus and freeing of cecal attachments.

THYMUS ENLARGEMENT.—

According to E. Boyd (*Am J Dis Child* 43:1162 (May) 1932), the conception that sudden death and certain respiratory disturbances in infants are attributable to an "enlarged" thymus is without sufficient proof. As a result of her own observations from necropsies and from statistical study of the literature, Boyd concludes that the so-called "normal" thymic weights have been derived from sick infants, and that the "enlarged" thymus found in well-nourished infants who have died or been killed suddenly represents in reality the normal thymus. She says that when illness has lasted longer than 24 hours, the weight of the thymus is reduced, regardless of the cause of death, with the exception of tumors of the thymus, leukemia and exophthalmic goiter. Thus, she argues that the concept of a pathologic state arose from misconstruing the normal prominent thymus and lymphoid tissue for a constitutional abnormality and *vice versa*, the involuted inconspicuous thymus of inanition being misconstrued for the normal.

TETANY.—*Etiology.*—It is believed by most authorities that tetany does not occur in the first few weeks of life. For this reason mention is made of the report by H. T. Nesbit (*Ibid* 44:287 (Aug.) 1932) of 6 cases in each of which during the neonatal period a tetany-like syndrome was observed. The infants were hypertonic with spas-

tic contractures of the upper and lower extremities, and had a positive Chvostek sign and hyperactive reflexes. Spasms of the extremities were elicited by the slightest disturbances in 3 of the cases. The cry was high pitched resembling a cephalic cry. There was cyanosis in most instances, particularly during the spasms, and pitting edema of the feet was also observed in some of the infants. All of these symptoms improved after the administration of calcium gluconate and parathyroid extract, although the serum calcium was not markedly lowered in the 4 cases in which it was examined (8, 9, 9 and 10.4 mg per 100 c.c., respectively). However, the author citing Jones' figure for serum calcium in infants from 4 hours to 12 days of age (average 12.3 mg per 100 c.c. blood serum), believes that the values in his cases may represent a lowered serum calcium for the newborn and, furthermore, that the calcium disturbance may be qualitative rather than quantitative.

RICKETS, CONGENITAL.—

Diagnosis.—The occurrence of true congenital rickets has been suggested by the x-ray picture of cupping of the long bones. Histologic studies, in the main, have not confirmed this. J. T. Farrell, Jr. and E. F. Burt (*J A M. A* 98:1801 (May 21) 1932) have observed cupping of the long bones in the x-rays of 7 of 48 newly-born negro infants. Unmistakable evidence of clinical rickets appeared in 4 of these from 5 to 13 weeks after birth. Similar deformities were observed in the x-rays of still-born infants, although histologic examination revealed no evidence of rickets. From their work, they conclude that roentgenographically recognizable cupping of the long bones may be present normally in the ends of the

long bones of the newborn, which results from a normal variation in the manner in which the zone of preparatory calcification joins the zone of proliferating cartilage

NITRITES.—PHYSIOLOGICAL ACTION—The effect of nitrites on *abdominal pain* arising from the gastrointestinal tract was observed by A J Beams (Arch Int Med 49 270 (Feb.) 1932) in a study of 60 cases. All the patients without organic lesions were relieved by the nitrites, whereas of 33 with organic lesions only 22 were relieved. Evidence is offered which indicates that the relief from pain by the nitrites is dependent on the cessation of peristalsis and the diminution in tone. The failure to obtain relief is probably due to the inability of the muscle to relax. Of 200 patients observed in fluoroscopic studies only 10 failed to show cessation of peristalsis and diminution of tone in the stomach and intestine following the use of nitrites. The author has found nitrites to be of great aid in differentiating organic deformities from functional disorders. As an antispasmodic, nitrites are to be preferred to atropine, but neither is wholly satisfactory.

As a result of a series of studies of the effects of the rapidly acting nitrites, *nitroglycerine* and *amyl nitrite*, in the usual therapeutic doses, on normal individuals and also on persons suffering from arterial hypertension and from the anginal syndrome, A M Burgess (Ann Int. Med 5 441 (Oct) 1931) has drawn the following conclusions except for a very transient fall in blood-pressure after amyl nitrite, neither it nor nitroglycerine, when used in the usual therapeutic doses, causes any consistent blood-pressure changes in nor-

mal human beings or in individuals with arterial hypertension, with or without severe renal damage or retinal arteriolar sclerosis. The fall occurring after the use of amyl nitrite is so rapid and transitory and so independent of subjective symptoms, that it is impossible to measure it accurately by taking blood-pressure determinations in the ordinary manner. This fact greatly decreases its usefulness as a test for arteriolar relaxability in estimating the prognosis in arterial hypertension. In persons suffering from attacks of angina pectoris of the usual ambulatory type, a rapid fall in systolic and usually in diastolic pressure takes place after the use of these drugs. The pain relief which occurs in these cases of ambulatory angina is independent of the pressure levels and, therefore, apparently independent of the action of the nitrites on the peripheral vessels, but due to their action in increasing coronary circulation.

UNTOWARD EFFECTS.—*Nitroglycerine* is generally considered a drug in no way dangerous to prescribe, and it is usually administered without any particularly careful supervision. However, in the course of recent studies in which therapeutic doses of nitroglycerine were given to 110 patients under direct observation, S H Procter and D Ayman (Am J M Sc 184 480 (Oct) 1932) observed alarming reactions to the drug in 4 instances. The reactions in these patients were similar in many respects. In each case there was a rapid and marked drop in blood-pressure, and the pulse rate was greatly diminished. Severe constitutional symptoms developed in all 4 patients, consisting chiefly of cold perspiration, weakness, restlessness, anxiety, and pallor.

Each patient presented a picture of impending collapse. The blood-pressure

of 2 patients became so low that it could not be recorded, and the pulse could not be felt. The rapid fall in the blood-pressure of another patient apparently was checked by the quick administration of *epinephrin*. Complete heart block developed in 1 case, in another case the course of coronary thrombosis was thought to be unfavorably influenced as a result of the lowering of the diastolic blood-pressure, thus probably increasing the size of the cardiac infarction.

The authors point out that the harm-

ful effects of nitroglycerine may be easily overlooked in coronary thrombosis, since this is a disease of grave prognosis, the ill effects of therapy are with difficulty separated from the frequent spontaneous fatal terminations. It would seem advisable, in the opinion of the authors, that patients with angina pectoris who are taking nitroglycerine for the relief of pain, should be carefully observed and at the earliest indication of coronary thrombosis administration of the drug should be stopped.

O

OBESITY.—TYPES.—Obesity has, for many years, been divided into *exogenous* and *endogenous* obesity. By *exogenous* is meant the type of obesity which occurs because of an increased caloric intake and too little exercise. The *endogenous* type is that which is thought to be due to some disturbance of the endocrine system. Unfortunately, many cases do not fit into either of these classifications and there must be in such individuals metabolic disturbance at fault.

M. Wilder (Internat Clin 1:30 (Mar) 1932) discusses the factors which play a part in the regulation of body weight. He discusses the usual theories of its causation and particularly the work which has been done on the metabolism of obese patients during and immediately after exercise. It has been felt by some investigators that metabolism falls rapidly after the initial stimulation and the resulting "luxus consumption" would account for the increased weight. Wilder was unable to confirm these reports by careful work in his own laboratory. He then speaks of the typical *endocrine types* of obesity,

the *thyrogenic*, which he feels should not be diagnosed with a basal metabolism of more than minus 20, the *pituitary* obesity in which he raises the question as to whether the typical adiposogenital dystrophy is due to disease of the pituitary body itself, as he points out that no pituitary extract obtained increases the basal metabolic rate and that injury or destruction of the tuber cinereum produces a condition very much akin to this. Even in the obesity due to *sex gland* abnormalities he feels that the gonads themselves play but a small part in the control of weight and that the gain in weight following castration may be explained, as a rule, on the basis of physical inactivity. He feels that the part the *pancreas* plays in stimulating the storage of fat is problematic.

Cerebral Obesity.—When all is said on the score of the endocrine glands, the impression remains that their rôle in the production of obesity has been astonishingly overestimated. Recent studies suggest that regulation exercised through the nervous system is more important. Especially significant are certain of the visceral nuclei of the tuber

cinereum and the walls of the third ventricle. The important evidence is as follows

1 Among the cases of adiposogenital dystrophy that have come to necropsy, the lesions found in the majority were not of the pituitary body, but of the *diencephalon*. In a recent review of the postmortem examinations in 149 cases, Leschke found 21 in which the hypophysis alone seemed to be involved, in all the others, clear evidence of injury to the *diencephalon* was present. It is questioned whether participation of the tuber cinereum and other adjacent parts of the *diencephalon* has ever been ruled out with certainty in cases of this kind.

2 When the hypophysis is excised by a method such as that of Philip Smith, which spares the overlying parts of the brain from injury, obesity never results. On the other hand, when the *diencephalon* itself is injured, obesity may follow with considerable rapidity, whether or not the hypophysis is disturbed. This has been demonstrated most satisfactorily by Smith, confirming previous similar results of Aschner, Camus, Roussy, Bailey, Bremner and others.

3 There are now on record a considerable number of cases of obesity which have developed so promptly on the heels of an attack of lethargic encephalitis as to indicate an etiologic relationship. Encephalitis attacks by preference the mesencephalon and *diencephalon*. It almost never affects the hypophysis. The fat may be distributed as in adiposogenital dystrophy, or it may be generalized.

4 The obesity which follows on injury or disease of the *diencephalon* is often combined with other symptoms referable to lesions of this part of the brain, such conditions, for instance, as

manifest or latent diabetes insipidus or glycosuria, or a disturbance of thermal regulation, or unusual lethargy.

The occurrence of obesity after organic disease of the brain raises the question as to whether *vegetative centers of the diencephalon* are not normally concerned in the control of body weight, and suggests that simple obesity may be due to functional irregularities of the same centers. There is a clinical similarity between the obesity of known cerebral origin and that in which no actual lesion exists. Thus, a tendency to good-natured cheerfulness is observed among both groups of patients, also a certain childishness or effeminacy, the intelligence may be weakened, unusual sleepiness and inattentiveness may be noted, also lack of energy and amenorrhea.

The fat boy, Joe, of "Pickwick Papers," is presented usually as an example of pituitary obesity. He might now be called a case of diencephalic obesity, but there is no proving it, and the identical clinical picture may be seen when all diagnostic methods fail to provide any evidence of organic disease of either the hypophysis or the brain. In other words, types of obesity are not so characteristic as to permit sharp differentiation, and if organic lesions of the *diencephalon* are responsible for some, it would seem not entirely improbable that functional disturbances of the same centers account for the others. The same argument holds here as with diabetes insipidus, in which organic lesions are often missing.

Constitutional Obesity.—The terms exogenous and endogenous carry little significance. Big appetites and lack of exercise play an important part in both of these types, and what makes for gain in weight in the endogenous case, may

be equally involved in the overweight from gluttony. The term constitutional should be applied, in judgment of the writer, to all cases of obesity which are not strictly secondary to acquired lesions of the brain or thyroid gland. The evidence for an *hereditary* factor is impressive. Von Noorden estimated that 80 per cent of all cases of constitutional obesity are familial, with which many authors agree, races show tendencies to adiposity or leanness and certain breeds of hogs, cattle, and horses can be fattened, while others cannot.

Danforth, of the Department of Anatomy, at Stanford, found a strain of yellow mice in which obesity developed at, or subsequent to, maturity, yet behaved in heredity as if due to the gene responsible for the yellow color. Although the trait appeared in both sexes, it was more marked in females, which occasionally attained weights 3 times as great as normal adults of other strains. The fat acquired could be practically all utilized under adverse dietary conditions. Danforth was inclined to regard the deposition of fat in these mice as due to some "functional peculiarity which in turn is dependent through few or more intermediate steps on the ultimate constitution of the germ plasm."

It is possible, he suggested, that the *ovaries* or other members of the *endocrine system* form a link in the chain, but also not improbable that back of these is a controlling nervous factor which may perhaps emanate from the real anatomic expression of the gene concerned. It is interesting that the fat yellow mice referred to by Danforth tend to have fewer litters than representatives of other strains, and ceased to reproduce at an earlier age. The regularity of estrum was not studied. Among women who are markedly adipose,

amenorrhea and sterility are by no means uncommon.

An interesting speculation concerns the rôle of sex in obesity, particularly of man. The female in other species is not, as a rule, more obese than the male, but the females of the human race are more obese, especially in the child-bearing age. Very few young men are overweight, but many young women are either fat, or struggling to avoid it. We may be witness here to an adaptation for race survival acquired in the struggle for existence in the nebulous time of the beginnings of *homo sapiens*, when living conditions were precarious, and the young required the continued presence of the mother. It may be presumed that the pithecanthropic male took the responsibilities of fatherhood lightly, foraged mainly for himself and found his food with reasonable regularity. The female, on the other hand, was confined by her offspring to her cave or its immediate environs and must have had to endure long periods of fasting. The ability to store food as body fat was for her a singular asset, the utility of which many of her present-day descendants are little prepared to appreciate.

Hunger and Satiety.—The mechanism of weight regulation may be hormonal or nervous, or both, but whether these influence metabolism directly is still conjectural and will remain so, as has been indicated, until distinct abnormalities in the metabolism of obesity are shown to exist. It is highly probable that nervous regulation is accompanied indirectly through control of appetite. Appetite is an urge to eat, compounded of the sensation of hunger and the feeling of repletion. Either element may be abnormal. Persons are encountered who experience extreme hunger, but

who are quickly satisfied The two often go together, *i e*, the persistence of hunger and the retardation of satiety Von Bergmann speaks of "*Hyperappetenz*", Umber of "*Dysorexia*"

Hunger may result from sensory impulses afferent from the stomach, as Carlson and his pupils have shown, or its stimulation may arise in other tissues, or originate from the composition of the blood The best evidence for stimulation by the blood is the desire for food that accompanies hypoglycemia It was thought for a time that hypoglycemia caused contractions of the stomach, but unpublished experiments of Heinz, of the University of Chicago Clinics, shows that the hunger which follows an injection of insulin may occur in the absence of gastric contractions Similarly, the sensation of repletion may be aroused by a variety of stimuli

Von Sohlern maintains that intra-stomachal pressure develops late and less intensively in persons of large girth It is Kestner's belief that mere distention is not sufficient to give the feeling of satiety, for it is not experienced when the stomach is artificially distended Strang and McClugage, in their experiments on specific dynamic action, see an indication that the rate of the change of metabolic rate which is determined by the ingestion of food is faster in thin subjects and slower in the obese and conclude that satiety is affected according to this rate of change. Whatever the mechanism of stimulation, it is clear that the urge to eat is a result of hunger, and the desire to stop eating is the result of the feeling of repletion, and that abnormalities of either of these feelings will result in gain or loss of weight.

Abnormal hunger, "Hyperappetenz," may be maintained either by abnormally intense stimulation or by stimuli of nor-

mal intensity acting on hyperirritable "appetite centers" The former condition is met with in cases of peptic ulcer with overactive gastric contractions Moderate gain in weight is not infrequent in these A more likely cause of gross obesity is *abnormal central irritability* This is certainly responsible for the weight gains that follow organic lesions of the subthalamie region Hyperirritability, in constitutional cases, would have to be passed by *heredity* from parent to child, much as unusual auditory or visual sensitiveness are transmitted, but this, to the writer's mind, is far more probable than any of the explanations of obesity based on postulations of endocrine disturbances or abnormal economy of energy.

DIAGNOSIS.—L F Barker (Internat Clin 3 42 (Sept) 1932), in discussing obesity in general, speaks of the 3 stages of obesity, *i e* (1) the enviable, (2) the comical and (3) the pitiable stage, and that in treating a case of obesity a general diagnostic survey is of grave importance to aid in picking up clues as to the nature of the obesity

Thus, when taking the anamnesis, the clinician learns about (1) inherited dispositions to obesity, (2) the personal habits of the patient as regards diet and exercise, and (3) the history of growth, of sexual development, of changes in weight, and of earlier infectious, neural or endocrine disease, that could have a bearing

While making the physical examination, attention to the general and to the regional distribution of the fat may inform the examiner as to the special type of obesity which is being dealt with Thus, if there be girdle obesity with general dystrophy, delicate acra, lack of secondary sex characters, and short stature, it will be known that *dystrophica*

adiposogenitalis is probably being dealt with

Again, if the patient looks prematurely senile, if the skin be dry and the backs of the hands and feet pudgy, and if there be abnormal pads of fat above the clavicles and abnormal rugæ in the face, it is pretty sure that the case is one of *hypothyrogenous obesity*

On the other hand, if a fat man should exhibit masses of fat about his hips, and should have large breasts, small testes, and a feminine type of voice, the examiner may feel certain that *eunuchoidal obesity* is being dealt with

Or, again, if there be massive obesity, with extreme hypertrichosis, a *hyperinterrrenal obesity* (cortex of the suprarenals) should be thought of

Furthermore, the distribution of the fat and its character on palpation are pathognomonic for the *lipodystrophias* and for *adiposis dolorosa* (*Dercum's disease*)

While making the special examinations, it should be remembered that a low basal metabolic rate is suggestive of a *thyrogenous obesity*, that a hypoglycemia suggests a *hyperinsular obesity*, and that bitemporal hemianopsia is suggestive of *hypophyseal obesity* or of a tumor pressing upon the hypothalamus

PROGNOSIS.—E Bulmer (Brit M J 1 1024 (June 4) 1932) discusses the dangers of obesity and its effect, and the increased mortality. He states that patients over 35 who are obese have a much shorter expectancy of life than those of normal or subnormal weight. He feels that the majority of cases of obesity are from an increased carbohydrate diet, that the treatment is simple and for the most part, dietetic. Obesity and hypertension are frequently associated and diabetes is a penalty for the

increased weight in the majority of cases. Degenerative diseases of a fatty nature in the heart arteries, kidneys and liver are 2.25 times as common in obese as in persons of standard weight and 3.6 times more frequent than in those under-weight. He has found, also, that chronic cholecystitis and gall-stones are much more frequent in these individuals.

TREATMENT.—D M Lyon and D M Dunlop (Quart J Med 1 331 (Apr) 1932) studied the weight reduction in 35 cases of different types of obesity. They feel that the amount of increased metabolism that can be created by exercise in the average case is very small and almost negligible and have found that when obese people attempt to take active exercise there is a danger of increased appetite which in itself results in further food intake. The recorded weight of their patients showed an excess of from 15 to 190 per cent, as compared to ideal weight for age, sex and height, with an average of 69 per cent.

In the construction of the diet, they emphasize the importance of bearing in mind certain physiological manifestations (1) that the amount of fat allowed can be reduced to a minimum, as it may be said that the body will call on its own storage to make up this loss, (2) carbohydrates are restricted as far as possible, but too great a restriction leaves the patient feeling unduly weak and also creates the possibility of acidosis. They feel that the protein metabolism is most important in the obese. In their 1000-calory diet the protein allowance was from 0.8 to 1.4 grams per kilogram body weight. All these patients were put on a standard reducing diet of 1000 calories which contained 100 grams carbohydrate, 60 grams protein and 40 grams fat.

Lyon and Dunlop point out that in order to judge the effect of a diet, it is necessary to continue on it for at least 7 days. They found that the low caloric diets were well borne and that all patients, even endocrine cases, lost weight on these diets. The rate of loss is greatest at first, and decreases as the diet continues. They feel that the behavior of a patient on a subcaloric diet may be divided into 3 distinct periods: (1) an initial period of a few days where there is a rapid loss of weight, which has been attributed to the dumping of water storage, (2) a steady but diminishing loss of weight proportionate to the size of the diet, and (3) a phase in which the weight maintenance is kept at a new level.

In investigating the effects of different foodstuffs, the authors found that the loss was inversely proportionate to the carbohydrate content of the food and that the total glucose available from carbohydrate and protein is a more important figure than the carbohydrate figure alone. This, they felt, was due to the well-known principle of retaining water on a carbohydrate diet and giving it out on a rich fat diet.

They then gave thyroid to all of these cases and feel that it can be given without danger in the average case of obesity, as they found relatively few that were reacting unfavorably to it. The thyroid was given in increasing doses and they found that 9 grains (0.58 Gm) of thyroid a day is required to produce a loss of weight equal to that caused by the 1000-calory diet.

After a period on the low calory diet Lyon and Dunlop found decrease in the basal metabolic rate during the period of undernutrition, which was increased about 20 per cent with the administration of thyroid. They found

no change in the respiratory quotient with thyroid. From their observations it would seem that the effect of thyroid in these cases has been to slightly increase the specific dynamic action of protein and fat, and to slightly reduce the figure for carbohydrates. They felt that the loss of weight on the low calory diets represents a removal of the fat and water from the body, but that with the administration of thyroid, a large amount of the increased loss was probably due to water which was excreted due to the negative nitrogen balance.

W. H. Nadler (Illinois M. J. 61:311 (Apr.) 1932) discusses the importance of quantitative diets in diabetes and obesity. He stresses the importance of adequate measurement of the diet, as expressed in grams of protein, carbohydrate and fat, and finds that in hospitals the measurement of diet is left entirely to the dietitians and that very few clinicians have had the opportunity to acquaint themselves with the principles of diet calculations. He feels that the ease with which diabetic patients are taught to measure their food shows that this is fairly simple of acquirement, and that the obese should be similarly taught to measure their diets. [There are now some diabetic manuals on the market in which the weights for various foodstuffs are converted into household measurements and this method of calculation has proven of practical value—ED.]

From their studies, A. Schittenhelm and B. Eisler (Klin. Wchnschr. 11:446 (Mar. 12) 1932), feel that prolactin influences not only the ovaries, but also the general metabolism. They employ it together with thyroxine for the reduction of obesity with menstrual disturbances. They gave 3 mg ($\frac{1}{20}$ grain) of thyroxine by mouth 3 times

a day for 4 days. The thyroxine was then discontinued and the prolan given, likewise by mouth, from 80 to 300 units a day. They feel that their results justify the thyroxine-prolan therapy in women with abnormal flows, but that it is contraindicated in patients with normal menstruation.

OCCUPATIONAL THERAPY.

—The administration of occupational therapy, according to F. E. Wood (Occup Therapy 11: 195 (June) 1932), depends upon several factors, the most important of which are the background of the physician, the problem of the patient, present and future developments, and ability to meet the thing as a whole. To him, intention is much more important to a proper solution of the problems than technic. It is a significant thing that suggestions should be made to the patient for only those things which may actually be carried out. Reaction is the method by which the individual learns. By proper activity it is possible to help the patient to store his subconscious mind with good material for objective expression. By so doing and building up a reserve, the patient is in a much safer condition. His own personal expression must be developed; if his learning to react is satisfactory, his expression will be good.

Color and *music* are 2 good examples of the law of effect. Either of these gives a definite sensation and because they are usually accompanied by pleasantness, they are much easier to learn and see. In addition to the eye and ear seeing and hearing, the mind must see and hear to establish improved learning and better conception. In many instances, Wood believes the procedure in assisting the patient is too much of a hit or miss method which lacks harmony of

product and there is only failure to help the mentally disturbed patient.

Productive activity, particularly *creative action*, is considered a sure method of directing emotions. One of the most difficult problems which faces the physician in dealing with such patients is that of breaking up the conventional methods of thinking and activity. Subjective living creeps into the old conventional manner and it is the downfall of the patient.

Some patients need to learn *self-assertion*. This may be done by color-exaggeration or other new activities, and with practice they learn a true average of expression and better balance of emotion.

Hesitation is often the result of inhibition and by breaking up the old conventional ideas of the patient and substituting or inducing free and natural expression, hesitation is discouraged and the patient with the characteristic indecision is benefited.

Fear is also the basis of many patient's problems. This frequently shows itself in a lack of confidence, and encouragement of expression in the crafts and arts aids materially in bringing back the *self-confidence*. The fact that the patient has helped himself from within is most gratifying to the patient. Realizing that such inward expression may need guidance of the variable or flexible type, experience teaches which is the best prescription for the patient. The aim, according to Wood, should be to consider the patient as a human being with problems for adjustment, rather than just a case of sickness.

The most important problems are those of personality, the many possible manifestations of complex behavior, the element of fatigue and what it may do to the patient. The reason for the pa-

tient's inability to concentrate must be sought and habits which may influence this condition must be studied

Whether the patient is elated, depressed, agitated, friendly, belligerent, verbose or mute, the personality must be gone into as quickly as possible, proof given of friendliness and willingness to establish firm foundations upon which to build a new adjustment for his benefit

As in other modes of therapy, the use of any one procedure for all cases of one general class has resulted in considerable failure. The erratic patient needs steadying, but it is unwise to immediately impose a routine of work or activity. It is better to build a program of slightly increasing steadiness with occasional laxity, and then there is built the desire for steadiness on the part of the patient

The *clinging vine type* is interesting because it is so common to all physicians. Here the individual with her every whim and act requires the undivided attention of her husband. Gradually, this patient will get her own materials, make her own adjustments and ends by producing beautiful things for herself and the hospital

The *extreme paranoid type* is the one who fears she may expose the fact that she is truly less competent than she would have anyone believe. Creative work such as modeling, painting or any so-called original planning, brings to light the creative ability and will give this patient an opportunity to show her superiority. The more time is spent in this expression of ego, the less time there is for the periods of paranoia

OLFACTORY DISTURBANCES.—Olfactory disturbances are very protean in their manifestations and they are of several varieties. *Hyperos-*

nia is increased sensitiveness to odors. Of the 2 forms, the congenital is more frequent while the acquired type results from the use of drugs, such as strychnine and cocaine. *Hyposmia* is an impaired sensitiveness varying from a slight degree to the complete loss of the smell sensation. This condition is frequently seen in infectious diseases and nasal infections. *Cacosmia* is the sensation of a disagreeable odor. It occurs in patients suffering from infected teeth, tonsils and sinuses, also in bronchiectasis and gastrointestinal disturbances. *Parosmia* is a perversion in the perception of odors. This condition is very important and the patients often deny themselves the pleasures of life because of it. This perverted odor is often a vile one and may manifest itself when the person comes in contact with food, clothing or even friends.

Anosmia is the loss of the smell sensation and may be temporary or permanent. The former occurs in upper respiratory infections, such as influenza, diphtheria, and various forms of acute and chronic rhinitis and sinusitis. It also is noted in allergic conditions and in persons exposed to irritating chemical vapors and in fumes resulting in the manufacture of alcohol, tobacco, phenol, etc. Permanent anosmia is found in intracranial lesions involving the olfactory area and in injuries to the head, as basal skull fractures in the anterior fossa which contains the cribriform plate with the olfactory nerves. Diseases of the nose which involve the olfactory area and which produce degeneration of the mucosa such as is observed in atrophic rhinitis, syphilis, and after prolonged use of cocaine, result in permanent anosmia.

Synesthesia is the experience of a sensation in one place due to stimulation ap-

pled to another place. This holds true in disturbances of the olfactory function, as E. M. Seydell described (J. A. M. A. 29:627 (Aug. 20) 1932). He cited the case of a woman, who, on hearing a false note, noticed a bad odor. He states that the sense of smell may also be associated in the same way, the odor of geraniums producing the visualization of a deep red color in one person, garlic, a deep green in another. He summarizes his remarks as follows:

1. In patients with olfactory disturbances, it is advisable to make tests of the acuity of the sense of smell, nasal taste, tactile sense and gustatory sense.

2. Careful olfactometric examinations followed, when possible, by accurate postmortem examinations, will extend the knowledge of olfaction. The cooperation of surgeons who come in contact with numerous skull fractures should be sought to assist in this problem.

3. The intravenous injection of smell substances appears to be valuable in (a) differentiation between the respiratory and the essential anosmias, and (b) the treatment of the peripheral parosmias.

4. Since the cacosmias and the peripheral parosmias are of a benign nature, it is essential that great care be taken in differentiating them from the central parosmias and hallucinations which point toward some serious cerebral disturbance.

TESTS.—H. Laemmle (Arch. f. Ohren-, Nasen- u. Kehlkopf. 130:22 (Oct. 8) 1931) discusses tests for the olfactory capacity and the clinical value of the topical diagnosis of the results thus obtained. After defining the various olfactory disturbances, *viz.*, hyposmia, anosmia, parosmia and hyperosmia, he evaluates various testing methods. He maintains that the formerly recom-

mended olfactory tests were of little value for the clinic on account of their complicated technique. However, *Bornstein's method*, which employs a scale of smells, in which the slightly penetrating odors are at the beginning and those of greatest penetrability at the end, was found to be both simple and practical, and it was used in 100 cases.

Moreover, Bornstein's scale of smells takes account not only of olfactory sensations, but of the fact that in the region of the nasal mucous membrane and of the pharynx there are also terminal organs for touch (temperature and pain) and taste (gustatory smell), which are involved in the perception of complex smells. The author first examined patients with local diseases of the nose (peripheral olfactory disturbances), and then cases in whom the olfactory disturbance was the result of disorders in the central nervous system, such as are caused by trauma, apoplexy, cerebral tumors, meningitis and cerebral abscess. It was found that as yet there is no reliable method to differentiate between peripheral and central olfactory disturbances. In organic disturbances of the sense of smell, only the olfactory component is impaired, whereas the tactile and gustatory components are preserved. If the tactile and gustatory components are also abolished, but the nasopharyngeal mucous membrane is normal, either a functional disturbance exists or the case is one of simulation. By means of the scale of smells it is possible to determine the various degrees of hyposmia. Between the subjective disturbances and the objective findings there may be discrepancies. The individual may not be conscious of olfactory disturbances, and occasionally subjective olfactory disturbances may not be demonstrable by tests. Individual fluc-

tuations in the olfactory sensation, its dulling with advancing age, abnormal fatigability or congenital absence of the olfactory sense, have to be considered when the sense of smell is tested

OMENTUM.—HYPERTROPHY.—J G Probst (Am J Surg 16 50 (Apr) 1932) believes that primary hypertrophy of the omentum is probably not associated with any inflammatory condition, especially in view of the lack of microscopic observations to substantiate the term "omentitis or epiploitis," thereby suggesting a state of inflammation. This hypertrophy may be due to some circulatory interference rather than to an infection in which the omentum becomes enlarged, edematous and hemorrhagic. The term "omental hypertrophy" seems much more appropriate to the author in view of his observations than omentitis or epiploitis, which suggest the association of the pathologic changes with an inflammatory condition.

TORSION.—The salient features of torsion of the omentum are summarized by J H Morris (Arch. Surg. 24. 40 (Jan) 1932) in the following conclusions:

- 1 The normal environment and anatomic arrangement of the great omentum are such as to favor rotation of this structure about its long axis, while the introduction of certain mechanical conditions and pathologic changes within and adjacent to it, supply the immediate exciting causes of such rotation.

2. It is clearly established that omental twists are capable of producing clinical symptoms of an acute and chronic character, and that this condition, therefore, merits some consideration in the diagnosis of abdominal conditions.

3. Variation in the intensity of de-

gree of rotation determines 2 basic clinical and anatomic types of torsion: (a) the complete, in which acute, progressive symptoms and marked pathologic changes are dependent on complete permanent circulatory obstruction at the site of twist, and (b) the incomplete, which is characterized by vague, chronic recurring symptoms and mild pathologic changes in consequence of incomplete, partial or temporary obstruction which permits repeated spontaneous restitution before pronounced organic changes develop.

- 4 Diagnosis presents obvious difficulties, as indicated by the fact that a correct preoperative diagnosis was recorded in only 79 per cent of 217 cases. A statistical study of the series, however, emphasizes certain essential clinical manifestations and points of history the recognition of which should enhance the precision of a preoperative diagnosis.

- 5 The deliberate fixation of the free margin of the omentum by suture to an adjacent structure may be the source of future complications, and its accidental inclusion during abdominal closure is to be carefully avoided.

SPONTANEOUS SEPARATION.—Spontaneous separation of the entire omentum is described by P Esau (Zentralbl f Chir 59 863 (Apr 2) 1932) as being a disorder that so far has not been reported. In the author's case the omentum became detached with torsion of a narrow strip. With the exception of a slight irritation of the peritoneum, which became manifest in the later stages and which was interpreted as appendicitis, there were no clinical manifestations. The patient was a lumber worker, aged 47, who was brought to the hospital with the signs of a not entirely typical appendicitis and who reported that about 2 months previously

he had had a similar attack, which, however, had again disappeared following 3 days of rest in bed. Since during the second attack there were no severe symptoms that necessitated an immediate operation, an expectant attitude was assumed and the symptoms again disappeared. However, a surgical intervention was recommended to the patient, and he consented.

The operation revealed that the omentum was detached and had become implanted between the ascending colon and the lateral abdominal wall, where it had formed adhesions with the adjoining tissues. Upward, it reached to the liver, and, below, it ended in a pedicle, which showed torsion and the point of which was fastened near the inguinal ring on the right side. The entire omentum, with the exception of the narrow attachment, had become necrotic. The omentum was removed and the recovery was uneventful. The operative specimen weighed 1100 Gm. The author describes the results of the histologic examination and in discussing the case history he states that the patient had an inguinal hernia on the right side. He considers this factor significant for the etiology, since persons with inguinal hernia of the right side are predisposed to torsion of the omentum.

TUMORS.—Tumors of the omentum, according to F. C. Pommersheim (Orvoskep. 21.30, 1931), may be divided into 2 large groups. In the *first group* are the *inflammatory tumors*, which may be primary or secondary. To the secondary inflammatory tumors belong the masses forming postoperatively about foreign bodies and those which result from torsion or strangulation. Both primary and secondary inflammatory tumors may be of the simple hyperplastic type which result in abscess

formation. They may also be circumscribed or diffuse. The majority of postoperative tumors of the omentum are of the circumscribed type with abscess formation, whereas the primary tumors belong to the diffuse type which are simple and hyperplastic. Postoperative tumors of the omentum frequently occur about omental ligatures and after partial extirpation of the omentum. They are situated on the margins rather than in the body of the omentum, and vary in size from that of a walnut to that of a child's head. They are round or oval, their surfaces are nodular, and they are composed of fatty tissue. They are closely related to the tumors developing around foreign bodies, such as needles and fish bones, which have penetrated the intestinal wall.

The author reports a case of postoperative omental tumor in which 3 abscesses developed about 3 ligatures applied in a previous operation, also a case of primary inflammatory tumor of the omentum in which the condition was at first believed to be a tuberculous lesion.

The *second* large group of omental tumors are the *true tumors*. These also may be primary or secondary. The latter are usually malignant and occur either by direct extension or by metastasis. The former are very much rarer, and may be either benign or malignant. The benign tumors which have been described include serous cysts, neuromata, lymphangiomata, dermoid cysts, lipomata and fibromata. The 3 cases of echinococcus cyst reported in the literature may also be included in this group. The malignant true tumors of the omentum are sarcomata with a most varied histological structure. Primary epithelial tumors of the omentum are extremely uncommon, only 12 cases having been reported.

The author reports a case of primary omental carcinoma in which the diagnosis was proved by histological examination at autopsy

In conclusion the author says that the diagnosis of omental tumors is frequently difficult and their treatment is surgical

OPHTHALMIA, SYMPATHETIC.—ETIOLOGY.—H. D. Lamb (Arch Ophth 7 97 (Jan) 1932) reports a case of sympathetic ophthalmia resulting from a nonpenetrating injury to the eye. A child of 6 years was struck in the right eye, resulting in an abrasion of the cornea without penetration of the eyeball. Two months later, the left eye became involved. Although the right eye was enucleated, the vision in the left eye was completely lost.

SYMPTOMS.—The premonitory symptoms of sympathetic ophthalmia are described by C. Damel (Arch de oftal. de Buenos Aires 7 133 (Mar) 1932). He stresses the importance of careful examinations with the slitlamp, even when the patient experiences no subjective symptoms. The early signs of sympathetic ophthalmia are: (1) white or grayish-white precipitates on the posterior surface of the cornea; (2) bedewing of the endothelial lining of the cornea; (3) isolated cells floating in the aqueous, and (4) white or reddish cells in the vitreous.

OPTIC NERVE.—Lymph channels and communicating spaces which contain a hyaline substance and wandering cells exist in the optic nerve and chiasm. E. F. Krug and G. L. Rohdenburg (Arch Ophth. 8 72 (July) 1932) injected oil and traced it throughout the optic nerve and chiasm and in the nerve

head of the other eye. They found that wandering cells pick up foreign soluble protein (old tuberculin) from one eye and carry it to the other. They could not demonstrate this with bacteria injected into the vitreous because of the marked inflammatory reaction which resulted in closure of the lymph spaces, so that migration along the channels became impossible.

E. Wolff and F. Davies (Brit J Ophth 15 609 (Nov) 1931) conclude from their experiments on dogs, cats and rabbits that nondiffusible dyes injected into the cranial subarachnoid space at pressures compatible with life do not enter the optic nerve.

ATROPHY.—Etiology.—G. H. Stine (Am J Ophth 15 949 (Oct) 1932) reports a case of polyneuritis, optic neuritis and optic atrophy due to *thallium poisoning* following the prolonged use of Koremlu depilatory cream. Improvement in the motor paralysis and visual acuity followed withdrawal of the drug. Thallium poisoning may cause cataract, keratitis, optic neuritis, retrobulbar neuritis and postneuritic optic atrophy.

Bretagne and Michon (Ann d'ocul 169 232 (Mar) 1932) report a case of arachnoiditis of the optic chiasm and optic nerve with increased intracranial pressure due to mild internal *hydrocephalus*, in a patient 20 years of age. Rapid loss of vision, followed in one month by ophthalmoscopic signs of papilledema and in 3 months by atrophy of the optic nerve head, led to surgical intervention. The diagnosis was made after the skull was opened.

ORBIT.—ABSCCESS.—F. A. Plum (Northwest Med 30 371 (Aug) 1931) describes a case of bilateral abscess of the orbit in a Japanese boy, fol-

lowing the appearance of a pimple on his upper eyelid near the base of the nose. The orbits were opened and drained through the frontal sinuses. The temperature dropped to normal very promptly following this procedure. Three months later there was 20/20 vision in the right eye, but there was no light perception in the left.

CYST.—A case of a large cyst of the orbit is reported by J. W. Crawford and E. Kellert (New England J. Med. 206:1041 (May 19) 1932) which displaced the eyeball and led to loss of vision. The mass was removed surgically but a definite pathologic diagnosis as to the origin of the cyst was not possible. Small cysts of the orbit occur frequently but large cysts are rarely observed. The origin of these cysts may be dermoid, hemorrhagic, or echinococcal. They may also arise from the synovial membrane lining the trochlea and pulley of the superior oblique muscle or of the optic nerve, or may arise from ectasia of the ethmoid cells, frontal sinus or nasal cavity. It should be remembered that encephaloceles (or meningoceles) must be differentiated from true cysts. The former usually occur shortly after birth and protrude along the line of suture of the cranial bones.

OPERATIONS.—Anesthesia.—The subject of orbital anesthesia is discussed by K. Apin (Klin. Monatsbl. f. Augenh. 88:651 (May) 1932). He points out that the ciliary ganglion lies 15 to 18 mm. behind the eyeball between the external rectus muscle and the optic nerve. To secure anesthesia, he inserts a 3.5 cm. needle through the fornix at the inferior lateral quadrant of the orbit and injects 2 cc. (32 minims) of a 2 per cent novocaine solution into the orbit.

OROPHARYNX.—MALIGNANT TUMORS.—Prognosis.

The most common malignant tumors of the pharynx and base of the tongue, according to G. B. New, A. C. Broders and J. H. Childrey (Surg. Gynec. and Obst. 54:164 (Feb.) 1932), are the *lymphosarcomas* and the *squamous cell epitheliomas*, graded 3 or 4. During a period of 14 years, 1393 patients with such tumors were examined in The Mayo Clinic. They present a review of 624 of these tumors which have been examined microscopically. Of all the cases, 29.2 per cent were treated. There was not much difference between treated and untreated patients; 74.95 per cent had been treated previously, and 39.42 per cent had been operated on previously. A great variety of surgical and nonsurgical treatment had been given previously in almost all cases, without the proper diagnosis having been made. Patients were treated at the Clinic by irradiation. Surgical procedures, diathermy or the cautery were used with this in selected cases. *Lymphosarcoma* was treated almost entirely with irradiation. Of the patients, 89.2 per cent were traced. Seventy-one (40.3 per cent) of patients treated were alive after an average of 43.1 months; 19 (10.8 per cent) lived 59 months; 68 (48.8 per cent) lived 19.9 months. Of all patients treated, 16.48 per cent are alive 3 years or more.

All patients treated averaged 34.5 months of life after examination, and all patients untreated averaged 6.8 months of life after examination. A higher percentage of patients with epithelioma graded 4 are alive than of those with lymphosarcoma, but the duration of life after examination is longer in cases of lymphosarcoma. Palliative treatment had little, if any, effect in pro-

longing life The life expectancy from onset of symptoms of all patients treated was 42.7 months, while in the untreated cases it was 17.9 months Of those who died, 96 per cent died of the malignant process, the local lesion causing the death of 84.5 per cent

Treatment.—It is pointed out by A Zuppinger (Strahlentherapie 43:701 (Apr 13) 1932), that Coutard's method of prolonged fractional x-ray treatment has led to great changes in ray therapy, in that now many tumors can be subjected to an effective treatment, which formerly could hardly at all be influenced He gives a report of 20 cases of malignant tumors in which the prolonged fractional x-ray treatment was employed, and in all of which the patients have been free from symptoms for more than a year In 19 of the cases the diagnosis was verified by the histologic examination Eighteen of the tumors proved to be *carcinomas* and 1 a *sarcoma* The neoplasms involved various structures, such as the epipharynx, maxillary sinus, cheek, tonsils, tongue, vallecula epiglottica, lateral column, larynx, pyriform sinus, vocal cords, mediastinum and parotid Surgical treatment would have been possible in only 4 cases The number of irradiations, as well as the dosage, varied in the different cases The total dosage was determined by the results, for the irradiation was continued until in the region of the pavement epithelium an uninterrupted layer of fibrin had formed In 2 cases radium treatment was necessary and in 2 others a surgical intervention was required in addition to the x-ray irradiations

The authors found that prospects for recovery are largely dependent on the extent of the regional metastases, on the size of the primary tumor, on the

patient's general condition and on the histologic structure of the tumor Prolonged fractional x-ray treatment, the author emphasizes, is not a cure-all, but is advisable in tumors of the mucous membranes consisting of pavement epithelium, in which, because of the location of the neoplasm, a radical operation is not advisable It can also be resorted to in operable cases when the patient does not consent to a surgical intervention or when the operation involves serious mutilation and the histologic examination indicates that the tumor is sensitive to ray therapy Prolonged fractional x-ray therapy should, of course, not be resorted to when another method that is more rapid and less trying for the patient promises the same results

The treatment of *pharyngeal carcinomas* by operation and by irradiation with radium and x-ray has not been especially satisfactory The aim of the new irradiation technic introduced by Coutard at the Radium Institute, in Paris, is to make the destruction of the tumor tissue as protracted as possible and to effect a continuous disturbance of cell division by dividing a large mass of irradiated energy into numerous single doses Heavy filtration (0.5 mm of copper) and the long distance of the tube (from 50 to 100 cm) bring about a marked diminution of the wavelength and of the intensity The total dosage is from 12 to 20 times that formerly regarded as admissible A marked inflammation of the skin (reddening and exfoliation) and of mucous membranes (diphtheria-like coatings), developing in from 10 to 12 days, retrogresses entirely after from 2 to 3 weeks The results achieved with this treatment excel anything previously accomplished by x-ray therapy Coutard reported, in

1928, 26 per cent of recoveries in tonsillar carcinoma, Regaud, in 1930, 20 per cent of recoveries in carcinoma of the hypopharynx. Baensch, of Leipzig, recently reported, before the Medizinische Gesellschaft of that city, similar favorable results, and recommends combination with radium irradiation. The presence of regional metastases of the glands makes for much poorer results. Although the metastases are much reduced in size by the irradiation—they may even disappear—they return in a few weeks in an accentuated form. The Coutard method marks a distinct advance in the treatment of previously hopeless cases.

E. Berven (*Deutsche med. Wchnschr.* 58:363 (Mar 4) 1932) emphasizes the better results obtained in recent years with radium treatment of tumors of the oral cavity. He ascribes these results to the improved technic of recent years. His report covers the years from 1916 to 1926. In the first half of this period, from 1916 to 1921, the treatment was usually begun with x-ray irradiation and was followed by surface contact application of radium tubes. After 1921, the brachyradium therapy in the form of surface contact application or of intratumoral application was gradually discontinued and teleradium treatment (from 5 to 6 cm. distance) was employed. The teleradium treatment was given in such a manner that the cone of rays attacked the tumor from various sides. The author points out that because the teleradium therapy requires great experience, it should be given only in special clinics.

A. Lang (*Beitr. z. klin. Chir.* 155:67 (Mar 16) 1932) advocates the use of radium in such localizations and in those stages of cancers in which surgical interventions are impossible or will

give less favorable results. He considers radium therapy especially helpful in cancers of the oral cavity, the results obtained being such that surgical interventions involving considerable mutilation are no longer justified. However, not only in cancers of the oral cavity, but also in those of the nasal cavity, of the larynx and of the palate, *i.e.*, in regions in which surgical interventions are extremely dangerous and difficult, radium produces favorable results. For cancers of the face and lips, radium is superior because of its more favorable cosmetic effects. The author emphasizes that he obtained his favorable results with comparatively small quantities of radium. He thinks that the experienced surgeon can use radium to greater advantage than the irradiation specialist, for the reason that in many cases the surgeon can place the substance more favorably.

W. Trotter (*Brit. Med. J.* 1:510 (Mar 19) 1932) believes that the final results of operative treatment in malignant disease of the hypopharynx must be considered from 2 points of view: (1) freedom from recurrence, and (2) the condition in which the patient survives. He emphasizes the value of precise local knowledge of the *epithelomas of the pharynx* in dealing with them by operation. Such knowledge makes possible the exact orientation of any necessary operation, and so increases the prospect of cure and at the same time diminishes the need for mutilation. The view is sometimes expressed that the more extensive an excision, the more likely is it to be successful; this is by no means necessarily true, for if the operation is not exactly oriented in regard to the growth, its mere extent is unlikely to save it from failure. This criticism applies to many

cases in which extirpation of the larynx is practiced in dealing with pharyngeal growths. There are only a few cases in which that formidable mutilation is of use in the treatment of such growths. Most of the cases in which the tumor cannot be removed without laryngectomy are incurable by any operation, and when the tumor can be removed by local excision, the mere addition of laryngectomy gives no further security. In a small number of illustrative cases mentioned, the only residual disabilities left have been the occasional fixation of one vocal cord, and in 1 case some fibrous constriction of the esophagus. The author would not feel able to record as a true success the cure of a pharyngeal carcinoma won at the expense of laryngectomy. He considers that one of the most beneficent effects of the introduction of radiotherapy has been its tendency to make one look with increasingly critical eyes at treatment by crudely mutilating operations.

OTITIS MEDIA, ACUTE.—

The last 2 years have seen various changes in the attitude toward middle ear infections in general. There is, in some parts, a tendency to be conservative in the care of these infections. Unfortunately, workers in the field are carried away, too enthusiastically at times, toward extremes of conservatism or radicalism.

ETIOLOGY.—According to Hastings (Lancet 1 919 (Apr 30) 1932), it is important to remember that for practical purposes all *acute and chronic infections of the mastoid bone* follow disease of the middle ear. It is possible that some cases of *tuberculous* mastoid may arise without previous otitis, and cases of *typhoid* and *syphilitic* disease of the mastoid are also occasionally seen.

A severe *injury* may start mastoid trouble. As a general rule, however, it may be said that mastoid disease is preceded by infection of the middle ear, though this may clear up completely before the mastoid infection gives evidence of its presence. The author first of all recalls a few points in the anatomy of this region. Infection of the middle ear always takes place by way of the Eustachian tube, so that as long as this tube is patent, whatever one may do to the mastoid or middle ear, reinfection can always take place. The mastoid antrum and cells may be regarded as diverticula from the middle ear, and whenever an acute infection of this cavity occurs there is pathologic evidence that the mucous lining of the mastoid antrum and cells is also more or less involved. As a rule, the mastoid cells get larger the farther the examiner passes from the antrum, the largest cell being usually in the mastoid process at its tip. In very acute cases the mastoid infection may be so severe as to cause acute osteomyelitis of the mastoid bone. As a general rule, however, mastoid symptoms calling for surgical treatment develop only when pus is retained under tension, and for this to happen there must be obstruction at 1 of 3 points, *i e*, the Eustachian tube, the aditus, or the communication between the mastoid antrum and one or more of the cells. When the Eustachian tube is the seat of the obstruction, the mastoid symptoms will be relieved by a free incision in the membrana tympani. When the obstruction is in the aditus and is not relieved spontaneously, nothing short of opening the mastoid antrum will effect a cure. Cases in which the obstruction is situated between the mastoid antrum and the cells usually come on relatively late, and all trouble in the middle ear

and antrum may have cleared up meanwhile

The relation of upper respiratory and alimentary tract flora to mastoid infections is discussed by S J Kopetzky and L G Hadjopoulos (Laryngoscope 42 661 (Sept) 1932), who present a study based on the total admissions to the Beth Israel Hospital, for all causes, for the 6 years from 1926 to 1931, inclusive. They found an appreciable increase in the incidence of otitic infections every 3 years. These infections start in November, reach their maximum in March and April, the minimum being observed in August and September. The chronic infections follow the acute ones, reaching their maximum in the summer and early fall, when the general incidence is at its lowest. The mortality rate is highest in the summer, when the general incidence is lowest. The ratio of acute cases does not explain this. The yearly mortality rate is not constant. The average for the 6 years covered by the authors' study was 5 per cent. The highest mortality was 8.6 per cent in 1930; the lowest, 2.3 per cent, in 1931. While *Streptococcus hemolyticus* was found to be the infecting agent in about 90 per cent of all cases and the cause of almost 80 per cent of the mortality from mastoid infections, *Streptococcus infrequens* was the type oftenest encountered in chronic mastoiditis. A study of the yearly variations of the streptococcic types in mastoiditis revealed an orderly sequence in their periodicity suggestive of recurring cyclic changes. They believe that a major cycle embraces from 5 to 6 years. According to their observations, 1927 was a type-indifferent year, 1928 an infrequens year; 1929 again an indifferent year; 1930 a preëminently pyogenes year; and 1931 a subacidus

year. The existence of such a cyclic change in streptococcic types is borne out by the observations for all other metastatic foci as well as otitic infections. The parallelism between the graphic curves for mastoiditis for other diseased centers and for the exposed mucosa of the upper respiratory and alimentary tracts, strongly prompts the inference that the last named may be the major source of all metastatic infections. The fact that certain viridans types of streptococci were regularly the precursors of hemolytic types with the same sugar-fermenting properties suggests the possibility that viridans forms may change into hemolytic types. The time element required to bring about such an alteration appears to be a year.

Marsigli communicated recently to the Società di cultura medica della Spezia e Lunigiana some statistical material on the ear complications of scarlet fever. The speaker discussed first the etiopathogenesis and the peculiar course of scarlatinal otitis based on observations made, during many months of specialized service, in the isolation department of the Ospedali riuniti di Roma. Supplementary to his personal statistics, he presented the results obtained from an analysis of the clinical histories of 1347 scarlet fever patients admitted during the period between 1925 to 1930.

Scarlatinal otitis manifests itself usually after the first 5 days of the disease, i.e., after the appearance of the exanthem. It presents the greatest frequency in the second week. Very early ear localizations cannot, therefore, be spoken of as being symptomatic of scarlet fever. The conditions associated with the disorder do not take on etiopathogenic importance. It is always a so-called *genus epidemicus* that constitutes, or produces, the ear complications

The two sexes are attacked with almost equal frequency (about 13 per cent of the scarlet fever cases). The percentage of cases increases between the ages of 1 and 4, varies considerably between the ages 4 and 8, and drops rapidly between the ages 9 and 15. The number of cases of bilateral otitis is high. The average ranges between 25 and 55 per cent. *Mastoiditis* as a complication occurs more often in the second and third week, and the proportion of such cases may amount to 29 per cent of the persons attacked. Many monographs on the subject state that there is a constant relation between the gravity of the anginose phenomena and the type of the ear suppuration, but there is no adequate proof of such a relationship. The period of development, the rapidity of the course, the early spreading to the mastoid cells, the co-existence of localizations in other organs, and the bilateral type of the lesions lead to the belief that the spreading to the tympanum by way of the circulation is more frequent than is commonly supposed. Marsigli calls the attention of internists to this dreaded complication of scarlet fever in order that, by acting in accord with the otologic specialist, the percentage of mortality and the number of chronic otitis cases may be reduced.

SYMPTOMS.—F. L. Lederer (Arch Otolaryng 14 248 (Aug) 1931) states, it should be realized that there are seasonal, individual, bacteriologic, anatomic and yearly variations in the symptoms in these cases. A case that is seen this year will not be the same as one seen last year. Much depends on whether or not an encapsulated organism is being dealt with, and the individual patient must be considered in every instance.

According to I. Friesner (*Ibid* 14 257 (Sept) 1931), the symptoms in acute systemic infections from the middle ear do not differ essentially from those of general invasions of other origins. It is true, that sometimes there are local manifestations, such as dilatation of the veins of the scalp and edema, due to the extension of the phlebitis and thrombosis to the superficial veins through the emissary. Of importance, too, as a local sign is the enlargement of the lymph node at the angle of the jaw. Involvement of a lymph node in this situation through an adjacent phlebitis differs considerably from the ordinary adenitis secondary to an acute infection of the upper respiratory tract. In the former, the node is firmer, and, as a rule, much more tender. Occasionally, there is pain or a feeling of fulness in the homolateral side of the head or pain in the eye. Indeed, the entire clinical picture may, at the beginning, closely resemble that of osteitis of the petrous pyramid with involvement of the fifth and sixth nerves. Occasionally, the early symptoms of a sinus thrombosis resemble those of an abscess of the brain, there may even be physical signs suggestive of beginning involvement of the pyramidal tract. Fever, chills and sweats are common, although the chills occur in only half of the cases and infrequently in children. The fever is often at first sustained at a high level and only after several days do the characteristic drops in temperature and subsequent rises occur. Frequently, the character of the temperature curve more than the height to which the fever rises suggests a general invasion. This is particularly true in aged and debilitated persons. The pulse is usually rapid and corresponds, at least in the beginning, with the temperature. As the disease

progresses, the pulse rate increases. An excessively rapid pulse rate is of unfavorable prognostic import. Enlargement of the spleen is common, and not infrequently both the spleen and the liver are palpable. The characteristic mental condition is euphoria, but the disease may begin with delirium or, having persisted for some time, may be associated with a psychosis or a wildly delirious state resembling the mental symptoms of belladonna poisoning. A rapidly progressive anemia follows the presence of hemolyzing organisms in the blood stream. As a rule, there is a leukocytosis of moderate grade, not so marked as is usually found in erysipelas, pneumonia or meningitis. There may be a leukopenia. Metastatic infections secondary to otitic bacteremias may occur anywhere in the body.

Treatment is solely surgical. Broadly it consists of an attempt to destroy the continuity of, and obliterate, the infected vessel. In this connection it must not be forgotten that a spontaneous cure of a phlebitis of the lateral sinus can, and not infrequently does, occur.

The *postoperative course of temperature* in otogenous septicemia was studied by R. Leidler (Monatschr f. Ohrenh. 66 185 (Feb.) 1932), who reports a series of 62 cases. Temperatures were taken 4 times daily, and in some instances every 2 hours, from the time of surgical intervention for the purpose of eliminating the septic focus in the sinus or the internal vena jugularis until recovery or death. In adults, the temperatures were taken in the axilla; in children, in the rectum. The author has not made the usual type of graph, but has picked the maximum temperatures and the minimum temperatures from the temperature records and represented each in a separate curve. In this way

he obtains a better oversight of the temperature movements and the relation of the 2 poles of temperature. In the study of the temperature curves, the author sees 4 facts revealed with certainty: (1) that in otogenous septicemia there are typical courses of fever, (2) the course of the maximum temperatures must serve as a basis for these types, (3) the minimum temperatures also show typical courses, and (4) the minimum temperature curves do not always run parallel with the maximum temperature curves at a lower level; their course is more often different and subject to its own laws. A discussion of theories of septicemia and especially of fever in septicemia follows. The author believes that the reason a "typical septic fever" is not recognized is not because the fever in diseases leading to sepsis is not subject to laws, but that these laws are not yet known. The author thinks the conception of Donath and Saxl is valuable; they believe that the infectious disease "sepsis" is a characteristic reaction of a person to infection with various bacteria. The septic reaction is the expression of the successful or failing resistance of the organism to widely differing pathogenic agents. Examining his statistics from the point of view of this conception of septic reaction, the author sees a battle between 2 forces, one of which forces the temperature up and one which pulls it down toward normal. The author suggests the hypothesis that the minimum curves show the more or less successful attempt of the heat-regulation center to overcome the heat resulting from the disease, and by the creation of nearly normal conditions, even if only for a few hours, to give the infection-resisting forces a chance to recover. The author points out the value of an

intensive study of the bacteriology and the blood picture of otogenous septicemia by systematic, frequent, possibly hourly, examination, to throw further light on the subject of septicemia, and especially the course of temperature in septicemia

DIAGNOSIS.—John Lewin (Brit M J 1 699 (Apr 16) 1932) reports 6 cases of acute mastoiditis and enumerates the following points, which may be of assistance in establishing a diagnosis of this condition (1) it is never too early in the course of an acute otitis media to suspect mastoiditis (2) Persistent pyrexia, in spite of adequate drainage of the middle ear, suggests mastoid involvement, and is itself an indication for operation (3) Absence of tenderness and signs of inflammation over the mastoid do not negate a diagnosis of mastoiditis (4) Involvement of important structures, such as the dura mater and the facial nerve, are often the first indications of mastoiditis and must be constantly watched for (5) To await edema behind the ear and pushing forward of the auricle, is to allow the disease to progress unduly These signs only indicate that the suppuration has come right through to the periosteum (6) Early diagnosis and operation spell less danger and less possibility of continued suppuration later on.

Many cases are sent to the hospital wrongly diagnosed as mastoiditis on the strength of edema and displacement of the auricle, and 2 conditions commonly give rise to them The first is *inflammation and suppuration in the post-auricular lymph node*, which is usually secondary to scalp infections or pediculi The absence of otorrhea or any form of otitis media should give the clue to the correct diagnosis The second is

meatal furuncle Furuncles occur only in the outer hair-bearing area of the meatus, and the lining here is so closely adherent to the underlying cartilage that the pus is always in the early stages under considerable tension and causes excruciating pain The infection may pass backward and give rise to edema and tenderness over the mastoid The presence of a discharge from the ear further suggests the possibility of mastoiditis There is no real excuse, however, for an error of diagnosis, as a meatal furuncle can always be seen on inspection Even if its core cannot be distinguished, the swelling and obstruction to the meatus are beyond anything seen in an acute otitis The intensity of the pain is also characteristic

N Asherson (Arch Dis Child 7 159 (June) 1932) states that in an infant the tympanic membrane may remain of apparently normal color and yet have pus behind it A temperature of over 100° F (37.8° C) with an unruptured tympanic membrane, during an attack of acute otitis media, even though such a figure has been reached only once during the illness, indicates the presence of a suppurative lesion, demanding *myringotomy* without delay Even if the patient is not seen until a late stage of the attack, when only a mild degree of fever is present, the same conclusions should be drawn if there is a clear history of an earlier temperature of over 100° F (37.8° C) The presence of high fever in an infant, even in the newborn, should lead to a suspicion of acute otitis media, calling for a careful examination of the ears In cases of infantile gastroenteritis the ears should be kept under the observation of the otologist If myringotomy reveals pus, the antrum should be drained, according to Asher-

son The literature of a few years ago contained the glowing reports of Dean, Marriott, Coates and others, regarding the relationship of ear infections to the gastroenteric disturbances in children Today, however, such cases are seldom heard of

In the anatomic consideration, it is unnecessary to have an x-ray made in the early stage to aid the pathologic interpretation, except that it is well to know whether the case is one in which an early breaking down (pneumatic) or a greater local resistance (diploic) can be expected

In regard to *early diagnosis*, F L Lederer (Arch Otolaryngol 14 248 (Aug) 1931) thinks that *tenderness at the onset* of otitis is due to periostitis and is not an indication for operation He differentiates between mastoidism, which is periostitis, and empyema, which is really mastoiditis The x-rays show variations and must be interpreted with a great deal of common sense The clinical observation should be considered before the laboratory observations. The finding of a high calcium content in the pus has been considered an indication of the amount of destruction of bone, and in some instances it has served to aid in the making of the decision to operate Wittmaack thought that when otitis media occurred with involvement of the mastoid before the age of puberty it interfered with the pneumatization of the mastoid Lederer thinks that this theory has been disproved In the x-ray examination, he always takes into consideration the question as to whether the patient has had a previous attack that might have altered the arrangement of the cells

The relation between x-ray and clinical symptoms in acute otitis is discussed by K Eisinger (Monatschr. f Ohrenh

66 266 (Mar) 1932) Since mastoiditis usually occurs in a relatively well-pneumatized mastoid process, whereas chronic otitis usually develops in cases with poor pneumatization the x-ray visualization of the pneumatization type is of prognostic value in the interpretation of symptoms such as profuse secretions, pain, rise in temperature, etc, when these occur late in the course of the disease and the otitis has not shown any definite tendency to heal spontaneously Absolute indications for operation, such as existing or impending intracranial complications, labyrinthine symptoms, paralysis of the facial nerve or subperiosteal abscess of the mastoid process, which demands intervention regardless of the stage of the otitis, supersede the indication of the roentgenogram The disease of the sinus wall within the mastoid process is practically symptomless and can only be inferred from the clinical course, the condition of the middle ear and tympanum and the type and amount of secretion; the x-ray, however, sometimes makes it possible to find the explanation of these manifestations However, the x-ray can never constitute an absolute indication for operation or be an indication in itself. In the early stage of otitis, certain clinical symptoms have little influence on the *prognosis* and indication because they belong to the normal picture, whereas a roentgenologically visible infection of the bone in the early stage of otitis is of great prognostic significance In the late stage every clinical symptom, though unimportant in itself, is of great significance, whereas a slight involvement of the bone occurring in this stage is not so significant A positive x-ray observation opposed to an amelioration of clinical symptoms in case of protracted duration of the disease may be

regarded as a lagging behind of the x-ray change (if the diagnosis of a mucosus otitis can be eliminated by clinical and bacteriologic examination), in mucous otitis, on the other hand, it is a valuable aid to therapy

DIFFERENTIAL DIAGNOSIS.

—*Meningitis* and *meningism* must of necessity be taken into consideration and J A Ryle (Guy's Hosp Gaz 46 123 (Apr 2) 1932) believes that, while they are specific of meningeal irritation, the symptoms of meningism are nevertheless not specific of any one type or cause of irritation. This is true of all well-defined symptoms. They constantly specify a type or mode of physiologic disturbance, but they do not in themselves indicate the particular cause of the disturbance. For a full diagnosis other clues must be sought in the age and the general condition of the patient, in the history, and in associated symptoms and signs. There are 4 main groups of cases in which meningism may be observed (1) acute pyogenic meningitis (meningococcic, pneumococcic, streptococcic); (2) subacute meningitis complicating general tuberculosis, poliomyelitis or activated syphilis; (3) the aseptic meningitis of subarachnoid hemorrhage, and (4) the meningeal irritation or aseptic meningitis of pneumonia and otitis media in children. With ordinary clinical care it should be possible to place a case in one of these 4 groups, and often enough to give a correct opinion. With the aid of the lumbar puncture needle, an accurate diagnosis can generally be established.

TREATMENT.—No one has ever denied that, due to the virulence of the invading organism and the poor quality of the individual's general resistance, infectious fevers have always been manifestly bad causative factors of middle

ear infections. A O Davy (M J Australia 2 72 (July 9) 1932) emphasizes the importance of *prophylaxis* of deafness and chronic suppurative otitis media in the infectious fevers. He believes that it depends on the early recognition and treatment of acute otitis media. The possibility of the occurrence of acute otitis media in any infectious fever should always be borne in mind. As its onset may be painless, the drums should be regularly inspected and the hearing tested daily with a watch. If it does occur, *paracentesis* should be performed without delay. In *scarlet fever*, *paracentesis* should be performed at the earliest sign of inflammation of the drum, *i e*, without waiting for it to become red and bulged. In addition, treatment to reduce congestion and swelling in the nose and throat is employed, which is in many respects similar to that recommended for acute sinusitis. If *acute mastoiditis* supervenes, the mastoid antrum is opened and drained. In all cases, and especially when aural discharge persists, adenoids should be curetted as soon as possible, dental caries treated, and, if necessary, tonsillectomy performed. Coexisting nasal sinusitis should be looked for and treated.

If, in spite of these measures and general treatment, the aural discharge lasts for some 5 or 6 weeks and does not show definite promise of shortly ceasing altogether, it is desirable that something more be done to prevent the continuation of the suppuration, which now threatens to be indefinitely prolonged. The author suggests that the correct procedure in many cases is to open and drain the mastoid antrum without further delay, even in the absence of symptoms and signs of mastoiditis, with the object of aiding the

middle ear to return as rapidly and as nearly as possible to normal. This sounds like a rather drastic measure for what is too often regarded as an unimportant condition. But it is a simple and safe procedure in experienced hands. The author has seen innumerable examples of serious results from delayed mastoid drainage, but he has yet to see any ill effects from its early establishment. When no abnormality exists in the nose or throat, even earlier mastoid drainage should be considered, especially in *postscarlatinal otitis*. This suggested extension of the usually accepted indications for drainage of the mastoid antrum will save many patients from the disability and discomfort of deafness. But, more especially, it should lessen the incidence of that tragic sequela of the infectious fevers, with all its dangerous possibilities, known as chronic "running ear."

In commenting upon the surgical treatment of *scarlatinal otitis*, P. G. Lepneva (Sovet. vrach. gaz. 5.265 (Mar. 15) 1932) states that there is no uniformity in the various theories on the etiology and, hence, treatment of scarlatinal otitis. She agrees with other workers that the complications in the ear secondary to scarlet fever may be of 2 forms. The *first form* does not vary from ordinary otitis, the *second form* is different from ordinary otitis in the depth and extent of the infection, which is characterized by rapid spread to the temporal bone. The first form often passes into the second, but the deep forms predominate in scarlet fever. The great number of deep-seated infections lead many workers to believe that the scarlatinal process in the ear has a tendency to extend to bone, to the facial nerve, the internal ear and the cranium. Early paracentesis and early trephina-

tion of the mastoid process may check the infection and its tendency to spread. During the period 1930 to 1931, among 380 patients with scarlet fever in the infectious disease clinics of a military medical academy, 90 patients, or 25 per cent, had otitis complications, ranging from catarrhal otitis to necrotic otitis, 14 of these were catarrhal and in the remainder there was a spontaneous or postparacentetic puriform discharge. A paracentesis was rarely performed on the first day of the examination, and in the whole group there were only 10 such interventions. Among 76 patients with puriform otitis, 39 had symptoms of a complication of the mastoid process and in 10 trephination was indicated, while 24 patients with mastoiditis improved without trephination. There were only 5 cases of anergic forms of necrotic scarlatinal otitis which involved the whole ear. The author's conclusions are as follows. The greater chronicity of scarlatinal otitis in contradistinction to ordinary otitis is a consequence of a lowered body resistance. Scarlatinal otitis extends intracranially more often than ordinary cases of acute otitis media. Disturbances of the ear offer the best indications for paracentesis and trephination of the mastoid process. In toxic forms of scarlet fever with almost entire absence of body resistance, trephination is contraindicated. In view of the late appearance of scarlatinal mastoiditis (in many instances after the patient has been discharged), patients convalescing from scarlet fever should be carefully watched until all the characteristic symptoms have disappeared. Treatment in all cases should be based, not on isolated symptoms, but on the whole clinical picture, and the physician should treat "the patient rather than the disease."

A definite problem is presented by S H Mygind (J Laryng and Otol 47 297 (May) 1932), who believes that the greatest difficulty in the treatment of chronic middle ear suppuration lies in the treatment of children, in whom radical operation, as also with unintelligent patients, generally gives unsatisfactory results. This also holds good for the simple resection or, preferably, the Bány partial resection, which, when obliged to operate, the surgeon often has to make do. In such cases it is not enough to provide only for conventional adenotomy. Children should be submitted also to comprehensive general medical examination. Their hemoglobin, Wassermann reaction, Pirquet reaction, rickets, family predisposition to ear trouble, catarrhs and tuberculosis, the state of their homes and diet must all be investigated, and all energy directed in the right direction in order to invigorate their general wellbeing. This demands much labor and a lengthy stay in the hospital, often accompanied by Finsen light treatment, baths and open-air treatment. But it is here that action must be taken, for it is often in childhood that middle ear disease begins its fateful course, even if it is much later on that it first shows itself in earnest, often as a serious inconvenience, sometimes as invalidism and, in certain, generally sudden and dramatic cases, terminating fatally.

In the same publication, Asherson tabulates the results in 100 consecutive cases of the radical mastoid operation and conservative mastoid operation in children. In a purely *tympanic infection*, the mastoid being healed, with no granulations in the tympanum, ionization with zinc sulphate will effect a rapid cure. Attention to the nasopharynx is essential. Thus, adenoids,

septic tonsils and sinusitis require attention. This is an essential part of the treatment. When *granulations* occur *in the tympanum*, they should be cauterized with 50 per cent solution of silver nitrate, and after a few days 1 per cent iodine powder should be insufflated regularly. *Hypertrophied granulations* or *polyps* require removal by scraping, snaring or curetting. The base should be cauterized with silver nitrate. This applies to the mastoid part of the excavation also. If there is much *bone disease* still present, or any atresia of the meatus present, further treatment by operation is indicated and the infective bone disease should be eradicated.

Among the accessory methods to be attempted in highly resistant cases are *heliotherapy*, *ionization* with very weak solution of silver nitrate or, after thorough cleansing, *packing* the cavity with strips of gauze impregnated with bismuth iodoform paraffin paste. The discharge persisting after the radical mastoid operation is usually an extremely chronic one, and reaction to treatment is disappointing in a large majority of cases, and further operation is usually called for unless the site of origin is localized to 1 or 2 definite spots.

In discussing conservative mastoidectomy for chronic suppurative otitis media, L G Brown (Brit M J 1 470 (Mar 12) 1932) calls attention to the fact that chronic suppurative otitis media (in reality, chronic mastoid disease) still remains far too prevalent, in spite of its admitted dangers to the patient and the loss of national efficiency due to deafness. Conservative mastoidectomy, though devised and advocated as long ago as 1907 by Charles Heath, has not yet gained the universal support

it deserves. The author advocates a modification of Heath's operation, termed "transantral attico-tympanotomy," and describes the results he obtained in a series of cases.

In a discussion of the clinical aspects of mastoiditis, with special reference to *indications* for antrotomy, based on the study of 150 cases of mastoiditis in which operation was performed in the Wurzburger Clinic, K. Schwarze (*Ztschr f Laryng, Rhin (Teil 1 Folia oto-laryng)* 22 76 (Dec) 1931) tabulates a summary of the cases submitted. The answer to the question as to when antrotomy should be performed in cases of mastoid complication of otitis media depends on the interpretation of the symptoms in relation to the duration of the otitis, as symptoms do not have the same diagnostic value at different stages of the disease. The patients of the clinic were divided into 3 groups, according to stages of the disease, and operation in each case depended on the presence of certain symptoms typical for the group.

The *first group* consisted of patients in the early stage of otitis media. In this group, operation was performed early only when there were symptoms of endocranial or general complication. It is not always possible to determine whether symptoms are due to the otitis or to an otogenous complication. Beginning mastoiditis in this stage may recede spontaneously if drainage is permitted by paracentesis of the tympanic membrane. Facial paralysis, which often complicates these cases, is due to toxic neuritis or to edematous pressure and usually recedes with the healing process. Paralysis of the abducens nerve is a sign of an otogenous complication, and examination of the spinal fluid and the fundus oculi and a

neurologic examination should be made to determine the necessity for operation. If there are no other symptoms, conservative therapy should be tried.

The *second group* consisted of cases in which there was otitis with beginning or complete exterior perforation of the suppurative process to the periosteum. The typical symptoms are projection of the auricle, painful inflammation over the mastoid process and inability to feel the contours of the bone. The suppurative process may also perforate in the region of the zygoma or into the auditory meatus. A pathognomonic sign of osteitis of the mastoid process is depression of the superior posterior wall of the auditory meatus. The general condition of the patient is of great value in deciding between an early or a late operation in this group.

In the *third group* were patients with advanced otitis media with symptoms of mastoiditis. If sensitivity to pressure and pain in the mastoid region and fever persist over a long period, or if a remission of these symptoms is followed by a recurrence, it is a sign of mastoiditis too far advanced for spontaneous regression. If there are also depression of the wall of the auditory meatus and protrusion of the tympanic membrane, these symptoms are sufficient indication for antrotomy in this group.

In discussing the indications for operation in *acute mastoiditis* before the Chicago Laryngological Society, Francis L. Lederer (*Arch Otolaryng* 14 248 (Aug) 1931) states that it is agreed that each case is an entity, a direct set of rules cannot be formulated to cover all cases. It is often purely personal experience that guides the otologist in the management of an individual case and makes surgical intervention desirable. Two factors should be borne in mind:

(1) the safety of the patient and (2) the future of the patient, particularly regarding hearing, prevention of chronicity, etc. Severe cases have been observed in which recovery occurred without treatment, and it is, therefore, difficult to judge operative indications or intervention by medical management based on these cases. As long as an actual principle cannot be set up, Lederer thinks that, as in every other disease, it should never be forgotten that the underlying pathologic state is the determining factor in governing the management in these cases. It is recognized that indications for operative intervention are often dependent on the ability and the temperament of the operator. The writer has always considered the indications under 3 groups: absolute, relative and atypical.

END RESULTS.—In order to learn the later fate of children who had undergone antrotomy during early childhood, H. Loebell (*Ztschr. f. Laryng, Rhin. (Teil 1 Folia oto-laryng.)* 21: 326 (July) 1931), studied the development of *pneumatization* of the mastoid process by means of the x-rays. A tabular report shows the results of the examinations in 20 cases. In 14, *i.e.*, in two-thirds of the cases, the pneumatization was inhibited, particularly on the side that had been operated on; in the other 7 cases it was normal. In reviewing the results of several other workers who have investigated this problem, he found that their conclusions were contradictory. He believes that this is due to the fact that most investigations were made on a comparatively small material, and he, therefore, considered it advisable to study the normal pneumatization process on those persons who had not had otitis media during childhood or in adult life and also on persons who had

had otitis in later life, after pneumatization had been completed. Investigations on 100 cases revealed that in 23, *i.e.*, in more than 20 per cent, there was marked inhibition of the pneumatization. This indicates that the inhibited pneumatization cannot be considered as the result of otitis media and of antrotomy, and the author thinks that more investigations, x-ray as well as histologic, will be necessary to solve the problem of pneumatization. Observations on 25 patients with *ozena* revealed in 11 of them normal pneumatization, and in 14 bilateral inhibition.

OTOSCLEROSIS.—PATHOLOGY.—A. A. Gray (*J. Laryng and Otol.* 47: 598 (Sept.) 1932) points out that in otosclerosis there is a degeneration of the fibers of the cochlear nerve, which appears first in the medullary sheath and neurilemma, and later in the axis-cylinder. This process occurs independently of the fixation of the stapes or of the bony change in the capsule of the labyrinth, and it probably precedes both. Deafness occurs as a result of the degeneration of the fibers of the cochlear nerve before the stapes is fixed. The clinical picture of otosclerosis is produced, for the most part, by the degeneration of the cochlear nerve, and only to a minor degree by the fixation of the stapes. The latter may add to the deafness already present and may also account for the relatively prolonged bone conduction. *Paracusis Willisii*, tinnitus and, for the most part, also the deafness, are due to the diseased condition of the nerve. The diminished secretion of wax in the meatus, the sluggish vasomotor reaction and accompanying diminished sensitiveness of the tympanic membrane, the bony change in the capsule of the labyrinth and the degeneration

eration of the cochlear nerve are independent of each other and do not stand in the relationship of cause and effect. They are called into existence by some common factor which is probably to be looked for in the vasomotor arc which controls the nutrition of the structures of the organ of hearing as a whole. These changes in the various structures are all degenerative in character and not inflammatory. They may occur in varying degree in the different structures in different individuals. Hence the clinical picture of otosclerosis varies within fairly wide limits in different cases.

OVARIES.—EFFECT OF MYOMA UPON OVARY.—An interesting investigation of the ovaries and endometrium of 56 patients with myoma, was made by P. Haggstrom (*Ztschr. f. Geburtsh. u. Gynak.* 102: 36 (May 20) 1932). In regard to the size of the ovaries, he states that in 28, *i. e.*, in exactly 50 per cent of his patients, the ovaries were of normal size. In 11 of the remaining 28, 1 ovary was of normal size. In 17 cases, both ovaries were larger than normal. In general, the size of the myoma exerts only a slight influence on the size of the ovaries, for normal as well as enlarged ovaries are found during existence of small and large myomas.

The consistency and the position of the myoma has no influence on the weight of the ovaries. In counting the follicles it was found that in younger women they were more numerous than in older women. The corpora lutea of the patients with myoma did not differ from those in normal ovaries, and thus the author cannot corroborate the opinion expressed by some investigators that they are especially large. Corpora albicantia were found in all instances

and in the majority of cases they were numerous. The latter fact, which by some is considered as a characteristic of the ovaries of myoma patients, the author considers a natural result of the advanced age of these patients.

Ovarian hemorrhages were present in 36 of the 56 patients and were found most frequently in myomas of medium size. Cystic degeneration was noted in nearly half of the ovaries. In 30 patients the ovaries showed signs of an existing or of a former inflammation. These signs of inflammation were more frequent in cases of larger than in smaller myomas. In 7 instances small fibromas were found on the surface of the ovaries, but these fibromas do not seem to have an influence on the hemorrhages in the myomas. Observations on the hyalinization of the ovarian vessels convinced the author that the degree of hyalinization is more closely connected with the age of the woman, with the number of confinements or with both of these factors than with the myomas.

The endometrium was examined in 54 of the 56 patients. In 23 instances it was entirely normal. In 21 cases the mucous membrane was atrophied, and hypertrophy was noted in only 4 instances. A change, characteristic for myoma, could not be detected in the uterine mucosa. Observations on 15 sterile women of the author's series indicate that, as the size of the myoma increases, the greater is the likelihood of sterility. The position of the myoma appears to exert no influence on the sterility.

OVARIAN TRANSPLANTATION.—Satisfactory results from ovarian *autografts* in 44 oophorectomized women (under 40) have been obtained by C. A. Castañón and A. J. Risolia (*Semana méd.* 1: 1469 (May 12)).

1932) These writers also secured satisfactory results from ovarian *homografts* in 7 other oophorectomized women ranging in age between 20 and 30 years. The donors in cases of homografts were young and healthy women who were undergoing operations for conditions such as fibroma or appendicitis. The donor and the recipient were operated at the same time in adjoining operating rooms by different surgeons, so that the graft could be implanted immediately upon its removal.

The following technic is employed for the implantation of the graft. A paramesial incision is made in the bi-iliac line, followed by an incision of the anterior sheath of the rectus muscle. The rectus abdominis muscle is displaced somewhat and the graft is applied behind it. The wound is then closed, care being taken not to pinch the graft.

The authors conclude that ovarian grafts may be employed in the treatment of the grave ovarian symptoms caused by the surgical removal of either one or both ovaries in women under 40 years of age who do not improve under hormonal treatment. The administration of a series of daily injections of a solution made up of macerated ovaries from normal individuals is advisable to stimulate the action of the homograft.

OVARIAN TUMORS—W B Bell and M M Datnow (Am J Cancer 16 1 (Jan) 1932) set forth a new classification of ovarian neoplasms. In this, newgrowths are primarily divided into those which are intrinsic in origin and those which are extrinsic, as follows:

Neoplasms of Ovary of Intrinsic Origin

A From normal functional tissues

- 1 Lepidomata (Adam's term for epithelial, mesothelial, and hypothelial tumors)

- (a) Capsular mesothelium
Surface adenomata { Innocent
- (b) Granulosa cells { Innocent,
Malignant
- (c) Lutein cells { Innocent,
Malignant
- (d) Interstitial cells { Innocent,
Malignant
- (e) Endothelioma and perithelioma { Innocent,
Malignant

2 From connective tissues

- (a) Innocent
Fibroma
Myoma
Myofibroma
Chondroma.
Osteoma.
Lipoma.
Angioma
- (b) Malignant
Sarcoma.
Mixed-cell
Round-cell
Spindle-cell
Specialized-cell
Rhabdomyosarcoma, etc.

B From developmental relics Lepidomata

1 Adenomata

- (a) Solid { Innocent,
Malignant
- (b) Pseudomucinous cyst-adenoma Innocent.
- (c) Serous cystadenoma Innocent
- (d) (?) Thyroma Innocent

2 Papillary adenoma { Innocent, Malignant

3 "Testicular adenoma" (ovi-testis) Innocent

C From sex-cells Teratomata.

- 1 Innocent cystic.
- 2 Malignant solid.
- 3 (?) Neuroma
- 4 Thyroma

Neoplasms of Ovary of Extrinsic Origin

A Developmental inclusions

- (a) (?) Suprarenal
- (b) Endometrioma.

B Invasion from without

- (a) Chorionepithelioma.
- (b) Endometrioma
- (c) Carcinoma.
- (d) Sarcoma
- (e) Experimental implantation

C Metastases secondary to

- (a) Mammary carcinoma
- (b) Gastrointestinal carcinoma
 - (1) "Krukenberg" type from stomach
 - (2) Adenocarcinoma from bowel or stomach
- (c) Uterine carcinoma
 - (1) Cervix uteri
 - (2) Corpus uteri
- (d) Thyroid carcinoma
- (e) Carcinoma elsewhere
- (f) Melanomata

These authors have collected the statistics of various observers including themselves. A total of 2603 cases were classified as follows

	Per Cent
Cystadenomata	47.6
Carcinomata, primary and secondary	20.4
Cystic teratomata	13.7
Papillomata	9.4
Fibromata	5.7
Sarcomata	2.2
Other varieties	1.0

In a later communication, W. B. Bell and M. M. Datnow (Am J Cancer 16:439 (May) 1932) discuss some points in the pathology, clinical features and treatment of ovarian neoplasms. The authors show that in tumors of the ovary the previous history of the patient is of considerable importance, especially with respect to malignant neoplasms. The average age of patients with both innocent and malignant neoplasms, except cystic teratomas and possible sarcomas, falls between 42 and 50 years—the period of reproductive involution. A large majority of all women with ovarian neoplasms, innocent and malignant, are parous.

The *symptomatology* is somewhat ambiguous, in that menstrual disturbances may be due to associated uterine lesions rather than to the ovarian neoplasms. Abdominal pain and loss of weight, however, are important indications of malignancy. The physical sign of as-

cites cannot be relied on as a determining factor in the diagnosis, since it is frequently present with innocent solid, and occasionally cystic, ovarian tumors. Ascites is observed only in certain well-defined circumstances and is due to mechanical or chemical irritation of the peritoneum.

Treatment is entirely surgical and should always be practiced in cases of innocent neoplasms. With these lesions, conservation of normal ovarian substance should be attempted in young women. Difficulties in diagnosis may sometimes deter the surgeon from acting in this manner. In *parous* women about or after the menopause, who form the majority of all cases, bilateral salpingo-oophorectomy with panhysterectomy should be done. If the patient is *nulliparous*, supravaginal hysterectomy with salpingo-oophorectomy is sufficient. In young parous women the removal of ovarian cysts by the vaginal route may be done with advantage. If laparotomy is performed, the tumor should be removed without preliminary tapping or puncture. The treatment of malignant neoplasms is curative or palliative. Lead therapy is often a useful adjunct to surgical procedures. Radiotherapy is not to be recommended.

Carcinoma.—In a series of 520 cases of adenocarcinoma of the uterine body S. R. Offutt (Surg Gynec. Obst. 54:490 (Mar) 1932), reports an associated carcinoma of the ovary in 11.9 per cent, and in 616 cases of papillary cystadenocarcinoma of the ovary there was associated carcinoma of the body of the uterus in 8.6 per cent. The Fallopian tube should be considered as one of the means through which transplantation takes place. Because of the similarity of the adenocarcinomatous cells in the embryologically similar tis-

sues, it is often difficult to determine which carcinoma is primary and which is secondary and whether or not there may originally have been 2 independent carcinomas. In cases of carcinoma of the ovaries, the possibility of metastasis to the uterine endometrium, even when there is no gross peritoneal evidence of extension of the malignant growth, must be borne in mind. Because of this possibility, hysterectomy at the time of removal of the ovaries must be seriously considered.

Granulosa-cell Tumors.—Granulosa-cell neoplasms or *folliculomata* are neoplasms arising from the membrana granulosa cells of the Graafian follicle and may be benign or malignant.

Described first by Rokitansky, in 1855, only recently has this subject been clarified by investigators, among whom may be mentioned E. Kluft (Monatschr f Geburtsh u Gynak. 86. 392 (Dec) 1930) and R. Meyer (Arch. f Gynak 145 2, 1931).

Ovule-like areas of collections of round or polygonal cells of varying size are found in apparently normal ovaries or in large tumors. This arrangement may be benign in character but occasionally a definite extension of the membrana granulosa cells beyond the usual limits may be noted, which may represent early malignancy. These tumors may yield an excessive quantity of estrin, thus increasing or reviving ovarian function by producing hyperplasia of the endometrium or hypertrophy of the uterus (H. Guggisberg. J Obst and Gynec Brit Emp 38 382, 1931, and F. J. Taussig. Am J Cancer 15. 1547 (July) 1931).

R. Meyer maintains that the ovule-like areas in neoplasms arising from the granulosa cells are produced by exudate from the cells and contain liquor fol-

liculi, the same as in a normal Graafian follicle.

Granulosa-cell cancer is not very malignant, as metastasis is rare. Bell and Datnow (Am J Cancer 16:1 (Jan) 1932) call attention to the fact that the growths seem to begin in many follicles at the same time, indicating some excessive stimulus of the whole follicular apparatus possibly by the pituitary (prolan A).

In the course of 4 years, E. Kluft (Arch f Gynak 150. 643 (Sept. 20) 1932) has observed 10 cases of so-called granulosa-cell tumor of the ovary. When the tumor occurs in the prepuberal period, uterine bleeding, enlargement of the breasts and accentuation of the secondary sex characteristics occur. In sexually mature women the presence of the tumor produces menstrual irregularities, enlargement of the breasts, an increase in the secretion from the breasts and hypertrophy of the uterus, involving not only the mucosa but the musculature as well.

Kluft believes that the incidence of the tumor is much more frequent than was formerly believed. In his material, among 247 ovarian tumors he found 196 cystomas, 37 carcinomas, 4 fibromas and 10 granulosa-cell tumors, or 4.4 per cent of all ovarian tumors. The tumor occurred in all ages, in children before puberty as well as in women after the menopause and in advanced age, but with greatest frequency between the ages of 30 and 60. He considers the *prognosis* with this tumor much better than with other carcinomas of the ovary. Analysis of all available cases showed that bilateral involvement occurred in only 6.2 per cent. Recurrences took place much later than in other forms of ovarian carcinoma. Granulosa-cell tumor cells are, like the tissue from

which they are derived, radiosensitive. Good results can still be obtained even after recurrence has taken place, either through operation or through irradiation.

OXYGEN THERAPY.—Oxygen therapy has been going through a probation period in the laboratory and in the clinic. A résumé of its status, after a 10-year probation period, has been made by W. H. Potts, Jr. (*Am. J. M. Sc.* 184: 616 (Nov.) 1932).

PURPOSE OF OXYGEN THERAPY.—The primary purpose is the combating of anoxemia, the clinical importance of which has been recognized since Haldane's book on "Respiration," published in 1922. Since that time, knowledge of various aspects of general metabolism has advanced with astonishing rapidity. Rarely, however, is the oxygen content of the blood of routine concern in the minds of the majority of clinicians. This is due to the fact that knowledge of anoxemia is relatively newly acquired and certainly complex, and the method of determining the oxygen saturation of the blood needs simplification. Potts is of the opinion that the time will come when the degree of anoxemia in certain diseases will be considered as regularly as the leukocyte count is now considered in acute appendicitis.

Statistics are not available which show a decrease in the death rate of treated patients, as compared with untreated patients. However, too many complex factors are involved, such as the type of organism, the age of the patient, and the presence of bacillema, to make it feasible to apply the statistical method accurately in a study of the importance of oxygen therapy. It is not a specific measure in pneumonia, any

more than the use of glucose is a specific measure.

TERMINOLOGY.—An appreciation of the following terms is essential to an understanding of the literature on oxygen therapy. By procuring samples of arterial and of venous blood, it is possible by the usual gasometric technic to determine the oxygen content. A portion of the blood is then saturated with oxygen and the total oxygen capacity determined. From this is obtained: (1) arterial oxygen content (cubic centimeters of oxygen combined with hemoglobin per 100 c.c. of arterial blood), (2) venous oxygen content; (3) total oxygen capacity (cubic centimeters of oxygen combined with the hemoglobin of 100 c.c. of blood when fully saturated).

The difference between the oxygen content and total oxygen capacity has been named by Lundsgaard the oxygen unsaturation. It may refer to either arterial or venous blood, and may be expressed as cubic centimeters of oxygen per 100 c.c. of blood or as percentage of the total oxygen capacity. In the latter, the data represent the per cent of total hemoglobin in the form of reduced hemoglobin. The oxygen consumption is the difference between the arterial and venous oxygen content.

These terms, however, fail to take into consideration the oxygen tension in the tissues, which is a factor of the first importance. As yet, no feasible method is available to furnish this information.

CYANOSIS AS A CLINICAL TEST.—While *anoxemia* and cyanosis are not synonymous terms, for practical purposes, the clinician at present must rely on the degree of cyanosis as an index of anoxemia, and for indications for oxygen therapy. Potts (*Ibid.*)

quotes Peters and Van Slyke, who state that in conditions such as pneumonia, where both cyanosis and tissue anoxemia are caused primarily by incomplete oxygenation of the arterial blood, while hemoglobin content is normal and the onset is too rapid for much tissue adaptation to oxygen deficit, there must be a close parallelism between cyanosis and anoxic symptoms

With increasing cyanosis, the arterial unsaturation becomes greater. The venous unsaturation varies in a similar fashion

PHYSIOLOGY.—According to H. W. Knipping and A. Moncrieff (Quart. J. Med. 1:17 (Jan.) 1932) the *ventilation equivalent* for oxygen is defined as the volume of air which has to be inspired in order that 100 cc of oxygen shall be obtained by the body (Anthony). In normal subjects its value is approximately 24 liters and under experimental conditions remains unaltered after food or on moderate exercise. It is raised by emotional influences, lowered by sleep, and considerably increased if the carbon dioxide or oxygen content of the inspired air is varied outside of physiologic limits. In pathologic conditions the ventilation equivalent for oxygen is altered according to various factors. Thus, depression of the respiratory center (*e g*, morphine poisoning) causes a decrease, and stimulation of the center (*e g*, diabetic coma) causes an increase in its value.

In disease of the circulatory and respiratory systems the equivalent is raised roughly in proportion to the degree of failure in the normal function of these systems. The equivalent appears to give a good indication of the state of pulmonary efficiency, and its determination may prove of value in connection with the development of thoracic

surgery. The type of dyspnea present in disease conditions may be elucidated to a certain extent by a determination of the ventilation equivalent for oxygen, which appears to give a rapid method of distinguishing between diabetic coma and morphine poisoning, for example, and in diabetic coma serves the further purpose of giving a delicate indication of the degree of ketosis present.

Potts (*loc. cit.*) states that under normal conditions, an individual in bed requires from 15 to 18 cc of oxygen per breath for maintenance of metabolism. Only 21 per cent of the inspired air is oxygen, and since the ordinary tidal air is about 500 cc, this means only about one-fifth of the available oxygen is used. This appears to be a generous reserve on first thought, but in diseased states, especially in the presence of fever, the oxygen requirement of the tissues mounts rapidly. When to this is added the crippling effects of a marked reduction in the vital capacity of the lungs, as when a large area of consolidation exists, it is noted that the reserve is greatly diminished. Gradually, oxygen unsaturation increases, the available oxygen in the inspired air remains constant, the respiratory rate increases with its accompanying fatigue, but the amount of air taken in per breath is limited by the vital capacity. The more rapid the respirations, the shallower they must be. Hence, the most logical method of breaking this vicious circle would be by increasing the oxygen concentration in the inspired air.

In studying the *metabolic action* of the inhalation of pure oxygen, P. Bielschowsky and S. Thaddea (Ztschr. f. klin. Med. 120:330 (May 4) 1932) examined first the influence of the inhalation of oxygen on the ketone bodies in the blood and on the acid-base equilib-

rium They found that it effects a decrease in the ketone body content of the blood of patients with increased ketone body content It also increases the alkali reserve and causes changes in the hydrogen ion concentration toward the alkaline side, particularly by a decrease in the alveolar carbon dioxide tension The authors also examined the influence of oxygen inhalation on the lactic acid content of the blood following intravenous tolerance tests with a 20 per cent solution of sodium lactate These tests were made first on dogs and then on human subjects, and it was found that when the tolerance test was combined with oxygen inhalation, the curve indicating the lactic acid content was considerably lower than when only air was breathed In order to determine the influence of oxygen inhalation on the lactic acid content without the tolerance test, epinephrine was administered, which ordinarily produces a considerable increase in the lactic acid content in the blood It was again found that when oxygen was inhaled, the lactic acid curve was considerably lower than when only air was breathed

INDICATIONS.—Oxygen therapy is indicated in both lobar and bronchopneumonia, in cardiac decompensation, and it has been used by Levy and Barach, in the treatment of 4 cases of coronary thrombosis. Anoxemia may play a close crucial rôle in determining the outcome after coronary thrombosis

At first, a state of shock, due to a sudden interference with blood supply of the heart, exists If the resulting myocardial infarction is large, congestive heart failure promptly develops, the heart becomes weak, its action is irregular and rapid, with the characteristic muffling and shortening of the mitral first sound. A fall in blood-pressure ap-

pears promptly Cyanosis develops and moist rales are heard at the base of the lungs The breathing is rapid and difficult Acute oxygen want develops as shown by both arterial and venous anoxemia The use of oxygen therapy in a concentration of from 40 to 60 per cent may aid in maintaining an adequate oxygen supply to the tissues of the body until the heart has had an opportunity to recover from the acute functional disturbance

Barach states that cases have been observed in which administration of oxygen prolonged life and resulted in recovery from the acute episode Two of 3 cases of coronary arteriosclerosis with chronic heart pain were relieved by exposure to an atmosphere of 50 per cent oxygen These cases were observed for approximately 6 months. In the relief of pain, the following factors may play a part the inhalation of 50 per cent oxygen in normal men is capable of raising the arterial oxygen saturation from 95 to 99 per cent In 1 of the cases of coronary arteriosclerosis observed, the arterial oxygen saturation was raised from 94 to 99 per cent While this is a small increase in per cent saturation, it suggests a considerable rise in the tension or partial pressure of oxygen available to the tissues and provides a possible explanation for relief of local anoxemia in the heart muscles High concentrations of oxygen cause the normal heart to beat at a slower rate and affect more markedly the heart in cardiac insufficiency, which suggests a lessened strain due to a greater oxygen supply.

Oxygen therapy has been used in bronchitis, asthma, hyperthyroidism, asphyxia, asphyxia of the newborn, influenza and certain neuropsychiatric affections. It has been tried in cases

of epilepsy, chronic arthritis, sepsis, diabetes mellitus, burns and hypertension, but no conclusions can yet be drawn

In commenting on the widening scope of oxygen therapy in the treatment of disease, A. L. Barach (*Anæsth and Analg* 11:71 (Mar-Apr) 1932) reviews several of the conditions in which it has proven of value and points out that it is indicated in acute pulmonary disease when an abrupt disturbance of function in respect to the absorption of oxygen has taken place. This includes lobar and bronchopneumonia, post-operative atelectasis of the lungs and atelectasis of the newborn. In addition, various types of acute and chronic cardiac failure appear to respond favorably to the inhalation of a high concentration of oxygen. Patients with chronic pulmonary fibrosis have improved by long-continued residence in oxygen chambers. In cases of asphyxia, such as carbon monoxide and morphine poisoning, the inhalation of oxygen, particularly when combined with carbon dioxide, is of great benefit. In other miscellaneous conditions conclusions must be withheld, in the author's opinion, until further carefully controlled clinical and experimental evidence is forthcoming.

Believing that some of the effects often ascribed by oxygen therapy may very well have been due to other factors in the management of these cases, W. W. Hamburger, L. N. Katz, and S. H. Rubinfeld (*Tr. A. Am. Physicians* 46:357, 1931) made a series of studies in which all these factors were controlled before, during, and after the administration of oxygen, and the management of the patient was the same while oxygen was administered as it was before its use. A total of 15 subjects were

studied. 6 cases of cardiac failure, in 1 of whom failure was due to a recent coronary occlusion, 4 of hyperthyroidism, 2 of pneumonia, and 1 of emphysema and chronic bronchitis in an advanced stage. Two normal subjects were also studied as controls.

In all but 1 case, the patients studied were put into an oxygen tent or oxygen chamber after a preliminary period of bed rest. All of the patients, with 1 exception, were studied for a period after removal from oxygen. During the period of oxygen administration the diet, medication and the routine handling of the case were kept the same as in the preliminary and final control periods.

The observations made included a study of the gaseous content and the pH of the arterial blood, as well as other analyses of this blood. In addition, observations were made of the vital capacity, minute volume of respiration, heart rate, venous and arterial blood-pressure, and of the clinical condition of the patient. A series of electrocardiograms taken during the various periods were also analyzed.

It was found that the arterial blood-pressure was not affected in any of these cases by oxygen therapy. The vital capacity and the venous pressure were also unaffected by oxygen. The length of time the breath could be held was lengthened. In most of the cases, including the normal controls and thyroid cases, there was a decrease in the minute volume of respiration. The most striking change was the slowing in pulse-rate observed in all the cases except the 3 showing auricular fibrillation. The investigators feel that the mechanism by which this slowing of the heart-rate is produced is not clear. It is not a change in the O_2 content of the arterial blood, because a slowing occurred in cases

where arterial oxygen-saturation did not change. It occurred in the oxygen tent as well as in the oxygen chamber. Changes occurred in the electrocardiograms, but they were not very marked, except for an increase in the amplitude of the Q-R-S complex.

The 4 patients with hyperthyroidism were subjected to the treatment to ascertain if any beneficial effect could be obtained and as controls for certain of the observations. One of these patients showed a drop in basal metabolic rate after leaving the oxygen room. Six patients with cardiac disease were treated with 40 per cent oxygen 8 times, with clinical improvement occurring 3 times. Two of the cardiac cases had severe acute anoxemia associated with heart failure, clinical improvement was observed twice in these cases in 3 oxygen treatments. One good result was obtained out of 5 treatments in the 4 cardiac cases with long-standing heart insufficiency and mild anoxemia, 1 of these patients died in the oxygen room; another soon after removal from the oxygen tent. Both of the pneumonia cases recovered during the oxygen treatment.

Surgical Conditions.—Boothby and Haines, of The Mayo Clinic, showed the advantage of oxygen therapy in treating postoperative conditions. Operation on the upper organs of digestion for cancer of the stomach, ulcer, fistula, biliary obstruction and pancreatic disease, since they predispose to pneumonia, create situations, clinically, which may be treated prophylactically by oxygen therapy. The workers at The Mayo Clinic observed that since the use of the oxygen tent, the incidence of pneumonia has diminished in postoperative cases.

Carbon Dioxide and Oxygen in Pneumonia.—Carbon dioxide is recog-

nized as the normal stimulant to expiration and Yandall Henderson and his coworkers have pointed to its efficacy in the treatment of pneumonia. Henderson considers it a significant fact that no one has yet reported the cure of an experimentally induced pneumonia by means of a vaccine, a serum or an antitoxin. On the other hand, experimental pneumococcic pneumonia has been cured with carbon dioxide. The use of carbogen, a mixture of oxygen and carbon dioxide, permits the more free use of morphine and other narcotic drugs to counteract excitement and restlessness. The stimulation to respiration afforded by carbon dioxide tends to counteract the depression of breathing which such drugs otherwise induce.

Henderson states that the principal physiologic effect of morphine is to raise the threshold of the respiratory center for carbon dioxide. This means that respiration under morphine automatically decreases the volume of air breathed per minute to an extent that, as the amount of carbon dioxide in the body is unaltered, a much higher concentration of carbon dioxide is maintained in the lungs, even when there is no carbon dioxide in the inspired air. When, in addition, the patient breathes air containing an appreciable amount of carbon dioxide, the concentration increases to amounts corresponding to or somewhat exceeding those in the lungs during moderate physical exercise, but without its hyperpnea.

Kline and Winternitz proved experimentally that the presence of fibrin plugs throughout the capillary bed of the pneumonic lung interferes with the penetration of a diffusible substance as trypan blue, injected intravenously, but the exudate offers no serious obstruction to the penetration of the dye into

the alveoli when it is injected intrabronchially. From this, a reason for the restricted action of immune serum in pneumonia was deduced, and a basis for the intrabronchial treatment of pneumonia suggested. This is the approach carbon dioxide therapy uses, and its soundness is strengthened.

CONCLUSIONS—Potts (*loc cit*) concludes that oxygen therapy has definitely established itself in the therapeu-

tic armamentarium. In those conditions associated with easily recognized anoxemia and in the more obscure conditions as they are recognized, the use of oxygen must find its place. The time is at hand when oxygen must be given a trial in serious cardiac and pulmonary conditions. That carbon dioxide will supplement oxygen is probable, and a valuable supplement it bids fair to be.

P

PANCREAS.—PHYSIOLOGY.

—In a study of the *carbohydrate metabolism* and its value in surgical diseases of the pancreas, J Krotoski (Chir clin polonica 2:166, 1931) collected data on 125 cases, 20 of whom had surgical diseases of the pancreas. In 1 subacute case of *pancreatic necrosis* spontaneous glycosuria occurred. In 4 of the 6 acute or subacute cases of necrosis, sugar was present in the urine 2 hours after the ingestion of dextrose. Of the 81 patients with nonpancreatic lesions, the urine of 4 showed sugar varying in amount from a trace to 2 per cent. Three of these 4 patients had biliary tract disease, and 1 had a gastric cancer. Because of the damage to the kidneys in toxic conditions such as pancreatic necrosis, tests for sugar in the urine in such conditions are of little diagnostic value.

In all of the 4 cases of acute pancreatic necrosis reviewed, the fasting blood sugar was high, ranging from 0.168 to 0.266 Gm per 100 c c. However, it was high also in cases of purulent peritonitis, in which it ranged from 0.154 to 0.185 Gm. In early perforations of duodenal ulcer without peritonitis, in acute appendicitis, and in intes-

tinal obstruction the blood sugar was normal or only very slightly increased. In acute conditions of the biliary passages a slight elevation from 0.120 to 0.144 Gm was found. In cases of acute peritonitis with high blood sugar which came to autopsy, no changes in pancreas were observed. Determinations of the fasting blood sugar in the postoperative course of pancreatic disease give a good idea of damage, exacerbations, or sequestrations of pancreatic tissue.

For the *tolerance determinations*, 50 Gm of dextrose in 20 per cent solution were given orally. The blood sugar was determined before and 45 minutes and 2 hours after the sweet drink. In the 6 acute and subacute cases of *pancreatic necrosis* the curves revealed a serious disturbance of carbohydrate metabolism. Of 14 chronic cases, 13 showed a decrease in tolerance. Of 42 patients with biliary tract disease, a few more than 23 per cent had demonstrable pancreatic lesions, but in addition, a number in whom concomitant pancreatic involvement was not probable had poor sugar-tolerance curves. Other factors, such as liver damage and acidosis, might have been responsible. Of 14 cases of *neoplasms*, 11 showed a decrease in toler-

ance Hyperthyroid patients showed a marked glycemia

When 10 units of insulin were given before the sugar, in pancreatic affections there was a marked flattening of the curve, but when the decrease in tolerance was not due to pancreatic insufficiency, the dose of insulin did not markedly affect the curve. Therefore, in insulin-resistant cases the pancreatic factor was excluded

The *influence of ligation of the pancreatic ducts* of dogs on serum amylase is outlined by C E Johnson and C H Wies (J Exper Med 55 505 (Apr) 1932). They demonstrated a sharp contrast in regard to the postoperative amylase concentration of the serums of dogs, depending on whether ligation of the pancreatic ducts was or was not a part of an otherwise prescribed operation. The characteristic feature is a marked rise of several hundred per cent in serum amylase concentration, sustained for several days, which is observed when the pancreatic ducts have been ligated

PANCREATITIS, ACUTE.—

Classification.—The following classification was suggested by G L McWhorter (Arch Surg 25 958 (Nov) 1932) after a study of 64 cases

A Acute idiopathic pancreatitis

- 1 Simple edematous or nonhemorrhagic pancreatitis
- 2 Hemorrhagic pancreatitis
- 3 Necrotic or gangrenous pancreatitis
- 4 Suppurative pancreatitis.

B Acute pancreatitis associated with malignancy

C Acute pancreatitis that follows trauma.

Etiology.—By prolonged experimental work and more detailed clinical

studies of acute pancreatitis, considerable information has been obtained regarding its etiology, although little progress has been made in reducing the incidence or lowering the mortality. The following classification of the etiology has been advocated by McWhorter (*Ibid*)

1 Infectious origin

- 1 By extension along the lymphatics
- 2 By extension from the blood stream
- 3 By extension along the pancreatic ducts from the duodenum or from the bile tract.
- 4 By direct extension from infected foci
- 5 Following activation of bacteria in the normal gland
- 6 By bacterial permeability from adjacent altered viscera

B Noninfectious origin

- 1 Mechanical, including stasis in the ducts
- 2 Chemical and originating in activated ferments, resulting from
 - (a) Bile
 - (b) Duodenal contents
 - (c) Degenerated duct contents
 - (d) Autolysis
- 3 Degenerative changes in the pancreas
 - (a) Secondary to benign or malignant tumors
 - (b) Resulting from vascular degeneration or hemorrhage
 - (c) Toxic changes following systemic disease
- 4 Trauma.

C A combination of two or more of the factors

In the following table showing the number of cases, percentage of frequency, and percentage of mortality, it is noteworthy to find that 35 patients showed some type of biliary tract disease, localized in the gall-bladder. Gallstones were present in 32 men and in 32 women. There was an acutely inflamed gall-bladder in 14 cases. Six patients were not operated, 7 had exploration without drainage, and 51 were operated

TABLE I
ETIOLOGY, PREDISPOSING FACTORS, AND TREATMENT IN PANCREATITIS

	Number of Cases	Percentage of Frequency	Percentage of Mortality
Idiopathic acute pancreatitis	64		54.7
Type I, acute edematous pancreatitis	18	28	28
Type II, acute hemorrhagic pancreatitis	27	42	70
Type III, acute necrotic or gangrenous pancreatitis	7	10	70
Type IV, acute suppurative pancreatitis	12	20	50
Men in total of 64 cases	32	50	62
Women in total of 64 cases	32	50	47
Obesity in total of 64 cases	17	26	85
Alcoholism in total of 64 cases	7	11	70
History of typhoid fever	5	8	60
Numerous childbirths	7	11	42
Emaciation	5	8	64
Jaundice	9	14	55
No previous abdominal symptoms	17	26	59
Sugar in the urine	8	12	62
Some type of diseased gall-bladder, total	35	54.5	52
Gall-stones, total	26	40	53
Gall-stones in 32 men	11	34	54
Gall-stones in 32 women	15	47	53
Acutely inflamed gall-bladder	14	22	50
Gall-stones with chronic inflammation but without acute gall-bladder changes	18	28	55
Chronic inflamed gall-bladder without stones	3	5	33
Acutely inflamed gall-bladder without stones	6	9	50
Gall-stones with acute inflammation of the gall-bladder	8	12	50
Chronic inflammation of the gall-bladder, with and without stones, total	21	33	57
No acute or chronic gall-bladder inflammation, total	29	45	58.8
(a) Gall-bladder distended	8	12	37
(b) Gall-bladder noted as definitely normal	16	25	56
(c) Gall-bladder not mentioned	4	6	50
Treatment			
(a) No operation	6	9	100
(b) Operation, exploration without drainage	7	11	57
(c) Operation with four chief types of drainage	51	80	49
1 Drainage only of peritoneal cavity	13	20	77
2 Drainage of pancreas alone, with and without abscess	4	6	None
3 Drainage of gall-bladder or common duct	25	39	56
4 Drainage of gall-bladder and pancreas	9	14	11

with some form of drainage as shown in the table

Treatment.—It is pointed out by McWhorter (*loc cit.*) that when supuration of the pancreas or inflammation of the gall-bladder was present, the mortality was lower when early operation with appropriate drainage was performed. Early operation is extremely important, as well as early diagnosis, and should be followed by an emergency operation unless patients are moribund or definitely improving.

Exploration of the biliary tract followed by drainage should be done in practically all cases, particularly in the presence of inflammation, gall-stones or jaundice

To reduce the incidence of pancreatitis, the prevention and treatment of obesity, gall-stones and foci of infection are important. Active or passive immunity may furnish some hope for the future. Prophylaxis by the early removal of gall-stones, and well-chosen operations on the gall-bladder for acute

and chronic cholecystitis, may prevent hepatic, pancreatic and other serious complications

Diagnosis.—It is pointed out by H L Popper (Deutsche Ztschr f. Chir 236 124 (May 17) 1932) that the pancreatitis which develops following interventions on the biliary system becomes manifest under various symptoms, none of which are sufficiently characteristic to permit a definite diagnosis. However, with the aid of systematic tests of the diastase content of the blood, it is possible to demonstrate a postoperative disturbance of the pancreas. Since the diastase values return to normal after a certain time, blood sugar tests should be made in order to determine the further course of the disease of the pancreas. If a pancreatic disorder exists, dietary as well as medicinal measures should be resorted to. Insulin should be given, but epinephrine and other medicaments that have a tendency to increase the blood sugar content should be avoided. Continuous drop infusion with sugar solutions is likewise inadvisable. The fact that, of 5 cases with postoperative pancreatitis, 4 had a fatal outcome indicates an unfavorable prognosis.

RUPTURE OF PANCREAS.—**—Diagnosis**—In reviewing the literature on rupture of the pancreas, C S Venable (Surg Gynec Obst 55 652 (Nov) 1932) has been impressed with the scarcity of information on the subject; most of the references bear on case reports based upon postoperative diagnosis. The textbooks, too, are far from elaborating. True, rupture of the pancreas rarely occurs in comparison with the frequency of rupture of other solid viscera within the abdomen. It is also true that it may not be recognized many times when it should be, and

because of the serious results which follow rupture more consideration should be given to the possibility of its presence in making a diagnosis following injury to abdominal viscera.

In many of the cases of rupture of the pancreas, it should be remembered that delayed or secondary hemorrhage complicates the condition, so that early recognition is imperative and surgical interference urgent.

The immediate syndrome following injury is that of incomplete rupture, the patient is in a condition of collapse, has epigastric pain, the abdomen is intensely rigid, the diaphragm fixed, etc. Those symptoms may subside but there is a recurrence of symptoms, with rapidly progressive intensity, associated with restlessness, increasing pulse rate, lowering of pulse pressure, thirst, general and increasing abdominal distention and rigidity, in short, the picture is that of intraabdominal hemorrhage, the symptoms appearing suddenly following a period of quiescence. It may be better compared with the picture produced by a ruptured ectopic gestation with its typical syndrome.

As is always true of the presence of free blood within the peritoneal cavity, the blood picture now changes promptly to a rapidly increasing leukocytosis. Even if the symptoms of hemorrhage are not so severe in onset and do not progress as rapidly as described, and it is found by comparison of the blood count at the time of injury and later that there is an increasing leukocytosis, this factor is of paramount importance in making a diagnosis. Blood counts, therefore, should be frequently made during observation.

When a diagnosis of rupture of the pancreas is made or reasonably suspected because of the continuation of

suggestive symptoms, prompt surgical intervention should be undertaken

Treatment.—The choice of approach is the paramedial incision around the inner border of the left rectus which is retracted outward. The peritoneum is entered through the bed of its belly. The tumor mass, with the stomach flattened out over it, and possibly with the gastrocolic omentum and transverse colon lifted up by it, now presents. The great omentum and transverse colon are lifted out of the wound and reflected upward so that the mesocolon, distended over the lower margin of the tumor, is exposed. The tumor mass is obviously fluid, transmitting a colorless appearance, unless there is hemorrhage, when it is bluish. The abdominal cavity is walled off by means of packs, an opening is made through the mesocolon into the lesser cavity, and the fluid is withdrawn by a suction apparatus. When the fluid is withdrawn, the opening through the mesocolon can be easily enlarged to permit of easy access to the pancreas. Any bleeding point is ligated and the rent in the pancreas sutured, particular pains being used to preserve and protect the pancreatic duct. In suturing the pancreas, its extreme friability should be remembered and the sutures not drawn too tightly, also, as catgut is an animal tissue and, though chromacized, will be promptly digested, linen is the preferable material to be used at this stage. Silk is possibly admissible, as the animal substance will probably withstand long enough to permit union. The author mentions these facts because of an experience he had in closing a pancreatic rent with No. 00 chromic catgut, in which the wound remained perfectly dry for 4 days, when drainage of pancreatic secretion became profuse.

Means for subsequent drainage should be instituted, for which purpose a small rubber tube (about No. 15 F) is threaded through the gastrocolic omentum into place when the opening in the mesocolon is closed. The tube is stabilized by means of a pursestring suture in the gastrocolic omentum and brought out of the abdomen through a stab wound lateral to the abdominal incision, which is now closed in the usual manner. The tube is connected to a container on the side of the bed and in this manner most of the pancreatic ferments, which are so destructive to tissue, may be carried off, the amount of drainage observed, and its character and change recorded.

This record is important and interesting, for the character of the fluid is controllable by diet. Wahlgemund first suggested, in 1910, the value of an antidiabetic diet which has been in general use since then. In the treatment of a case, Fast found that the addition to the diet of 2 ounces (60 c c) of karo each 24 hours reduced the secretion from 4 to 2 ounces daily. Amylopsin does not have any effect on tissue, while trypsinogen, unless activated by bile or necrotic tissue, whether caused by bacteria or otherwise, is inert and is easily subject to control by diet. By a rigid antidiabetic diet the secretion may be made almost trypsinogen- and steapsin-free, while with the addition of proteins and fat they will reappear. An alkali should be given, as the hydrochloric acid of the stomach excites the flow of trypsinogen. For this purpose, the author found recently that calcium gluconate could be taken over a long period with none of the distress incident to too much sodium bicarbonate. Takadiastase or pankreon, or some similar pancreatic substance may be given to

make up for the secretion lost through drainage.

Incident to drainage, there is some leakage around the tube, however well placed, so that it is necessary that skin protection be provided. In a recent case the author found that **xeroform** offered the most perfect skin protection, there was not even redness of the skin at any time and no desquamation. In a case of severely destructive wound necrosis, Fast used **Witte's peptone** locally with good results. For the same reason that an alkali is given to neutralize the acid of the stomach, decinormal **hydrochloric acid** has been suggested and used locally in an attempt to control wound necrosis due to pancreatic ferments, but the author concurs in the belief that it is of value because it incites the flow of trypsinogen. The use of meat extract about these wounds is also contraindicated because it helps to form trypsin. Both the mortality and morbidity in wounds of the pancreas are largely dependent upon the quality and quantity of the pancreatic juices liberated. Far the greatest harm is done by trypsin, which has been found to be the outstanding factor in the creation of the complication and sequelæ described by the author.

PARASITES.—BOTHRIO- CEPHALUS ANEMIA.—*Diagnosis.*

—An interesting review of the literature bearing on the subject of bothriocephalus anemia is presented by I. W. Birkeland (*Medicine* 11:1 (Feb.) 1932). He states that the great majority of persons who harbor the fish tapeworm in the intestine suffer no ill effects from this parasitism. In some instances there are symptoms referable to the central nervous system in the form of neurotic states, other functional disturb-

ances or fits, to the alimentary tract, with functional disturbances in the form of irregularities of the bowel, stomatitis or glossitis, and, finally, in the blood which may show changes suggestive of an incipient anemia.

Observation of these cases has resulted in the drawing of a line at the level of 4,000,000 red blood cells for each cubic millimeter between the anemic and nonanemic blood picture. With but few exceptions, according to the author, diphyllobothrium anemia runs true to type. In the majority of instances, it is indistinguishable from cryptogenic pernicious anemia clinically, hematologically and pathologically.

Achlorhydria is present in about 84 per cent of this type of anemia and where acid is present it is below the average.

Subacute combined sclerosis has not been thoroughly investigated in association with the anemia under consideration. Numbness and tingling in the hands and feet are common complaints, but gross lesions of the spinal cord seem to be extremely rare.

Before the etiologic significance of the tapeworm had been duly recognized, the same grave prognosis prevailed in diphyllobothrium anemia as existed for pernicious anemia until the introduction of liver therapy.

PROTOZOA.—According to E. C. Faust (*J. Lab. and Clin. Med.* 17:639 (Apr.) 1932), the protozoa found in human tissues and exudates include forms belonging to all 4 major groups of the phylum *protozoa*, viz., the *rhizopoda*, as illustrated by *Endameba histolytica*, the *mastigophora*, as illustrated by the intestinal flagellates and the trypanosomes: the *sporozoa*, as illustrated by the malaria plasmodia; and the *ciliata*, as illustrated by the *Balan-*

tidium coli For purposes of convenience the author considers these protozoa under 2 categories (1) those living in the intestinal tract and adjacent organs, and (2) those primarily involving the hematopoietic organs, blood stream and other body tissues

Diagnosis.—L Morenas (Lyon méd 148 776 (Dec 27) 1931) asserts that duodenal intubation is of great scientific interest to the parasitologist, since it aids in the verification of the habitat of certain *protozoa* of the intestine and following the instillation of magnesium sulphate in the gall-bladder To the clinician it is a valuable aid in the diagnosis of parasitic infections of the intestine (helminthiasis, protozoal enterocolitis, amebiasis) and of the biliary tract (hepatic distomatosis, hydatid cysts, protozoal infestation of the biliary tract) The vegetative forms of the protozoa which are present as cysts in the stools are to be found in the duodenal contents The echinococcus of hydatid cysts is present in the bile and can be recovered As for the chronic angiocholecystitis of protozoal origin, the centrifugated sediment of the bile will often demonstrate the presence of lamblia, chilomastix and sometime trichomonas and *Endameba dysenteriae* From a therapeutic viewpoint, the author finds duodenal intubation a useful means of control in treatment and itself a therapeutic adjuvant in the administration of medicaments

LAMBLIASIS.—**Diagnosis.**—Chantriot (Clinique, Paris 27. 29 (Jan) (B) 1932) introduces his discussion of the treatment of *lamblasis* by mentioning the diagnostic difficulties Pathogenic intestinal bacilli and *Endameba histolytica* have frequently confused the diagnosis and in many positive cases of infection with the lamblia there is a

negative phase during which the parasite may not be found If fecal examination is negative for *Endameba histolytica* or abundant polymorphonuclear cells and the patient exhibits a persistent dysenteriform syndrome, together with a strong alkalinity of the feces and a marked urobilinuria, the author makes a diagnosis of lamblasis In 50 per cent of the cases subsequent fecal examinations confirmed the diagnosis

The author's clinical observations substantiate the opinion that the alkalinity of the residual fluids in the duodenal-biliary retreat favor the localization and persistence of the saprophytic forms Chantriot recognizes in his patients 4 forms of lamblasis (1) the hepatic form, (2) the enterocolic form, (3) the hepatodysenteric form, and (4) the form with associated diarrheas

Treatment.—His treatment, based on his conclusions, consists of (1) intense and prolonged medical drainage of the bile ducts with the usual cholagogues and antiseptics; (2) simultaneous and prolonged administration of lemonade or diluted hydrochloric acid to neutralize the alkalinity of the duodenal-biliary fluid, (3) the injection of a proprietary preparation of arsenic and emetine as an antiparasitic agent, and (4) the systematic treatment of the so-called healthy carrier of cysts, consisting of examination of feces, duodenal drainage and supervision of the diet

AMEBIASIS.—**Diagnosis.**—A method for the diagnosis of amebiasis has been described by A C Reed and H G Johnstone (J A M A 99 729 (Aug 27) 1932) They state the diagnosis rests solely on the microscopic identification of the pathogenic *Endameba histolytica* An unqualified

technician frequently gives an unreliable and a dangerous report. Unless the diagnosis can be safely made, it is much safer not to attempt it at all.

Ordinary stool specimens must be examined for amebic cysts within 48 hours as the chromatoidal bodies disappear and the cysts break up, so that positive observations become less as time progresses. Many of the patients with amebiasis even in the absence of a diarrhea show motile amebas, together with cysts, or alone. Motile amebas soon die and, therefore, require quick examination of the stools. Examinations should be made for 6 successive days and the use of some *Epsom salts* is beneficial. A *sigmoidoscopic examination* should be made and swabs taken from the ulcers. In the absence of ulcers, mucus and fecal material from the sigmoid wall should be examined for the parasite.

Certain identification of the ameba is best done, according to the authors, with the use of the iron hematoxylin stain, which should be a routine procedure in the stool examination for protozoa.

The authors have discovered a method which obviates the difficulties enumerated and meets all the requirements for accurate diagnosis. It depends on the preparation of smears by the attending physician directly from the patient in such a form that the motile amebas are preserved, as well as the cysts, and swab specimens are also taken, as well as fecal specimens. These wet smears are sent to a central laboratory for staining and study.

The method is summarized as follows:

A small amount of the fresh stool is spread upon a clean flamed slide with a paste brush. Longitudinal strokes are made to facilitate microscopic examination. Approximately 1½ inches of the surface length of the slide should be covered. Before the slide is allowed

to dry it is quickly immersed in Schaudinn's fixing fluid, which is made of 2 parts of saturated aqueous mercuric chloride in physiologic solution of sodium chloride and 1 part 95 per cent alcohol. This is the stock solution and will keep indefinitely. Four c.c. of glacial acetic acid is added to 96 c.c. of stock solution on using.

The slide can either remain for 10 minutes in the fixing fluid heated to 60° C. or be kept overnight in the fluid without heating. The slide is then placed for 10 minutes in 70 per cent alcohol tinged to a wine color with compound solution of iodine. Following this, the slides are placed in 70 per cent alcohol for 5 minutes and then put in bottles containing 70 per cent alcohol for mailing.

Pathology.—K. Hiyeda and M. Suzuki (Am J Hyg 15:809 (May) 1932) described the pathologic changes in 5 human cases of amebic ulcers found in the colon. The course of the infection is described by the authors as follows. After the ameba enters the lumen of the large intestine, the intestinal epithelium produces a large amount of mucus, which prevents many of the amebas from entering the tissues. This struggle between the tissues and the amebas may last for a period of from 2 to 8 days. When the amebas succeed in coming in contact with the epithelium, they give rise to a necrosis or necrobiosis of the superficial layer of the lining cells. Multiplication of the amebas occurs rapidly and toxic substances produced by them come in contact with the mucous membrane, causing necrosis. As the amebas extend deeper into the tissues, they continue to multiply and produce larger areas of necrosis. Finally, a large typical crater-like ulcer develops. When there is a marked secondary infection, it is common to find the formation of an abscess. Those amebas which are in the tissue of the submucosa make their way mostly longitudinally to the axis of the intes-

time This is the explanation for the observation that the ulcers are wider beneath the surface than on it It also explains the tunnel-like formations between the intact epithelium If the tissue-regenerating activities are pronounced enough to overcome the amebas, reparation of the ulcers occurs and there is a thickening of the submucosa

When there are small ulcers occurring with only a few amebas in their vicinity, the balance of the amebic vitality and tissue resistance is well kept and no marked symptoms occur This is the state of affairs which occurs in the *amebic carrier*

When a mixed infection is present in these ulcers, there is a cellular infiltration None of the leukocytes have a special affinity for the amebas or their toxic products The amebas in equilibrium with the local tissues will remain so for long periods of time, but if the equilibrium is disturbed for any reason, the amebas may become more active and result in an acute exacerbation

Treatment.—An extensive study of the effects of amebicidal drugs upon tissue culture cells has been made by M. J. Hogue (Am. J Trop Med 12. (Mar) 1932). The writer states that there are 3 drugs in common use for the treatment of infections with *Endameba histolytica* emetine hydrochloride, yatren (iodo-oxy-quinoline sulphonic acid) and dihydranol (2 to 4 dihydroxyphenol-n-heptane) A fourth substance is being used by de Rivas, which consists of equal parts of glycerin and a 30 per cent solution of magnesium sulphate.

These four amebicidal drugs were made up with Locke-Lewis solution in dilutions of 1.1000, 1 10,000 and 1 50,000. Emetine was also diluted 1

100,000 Tissue cultures were made from small pieces of the intestine of embryonic chicks from 7 to 9 days old Hanging drops were used for their growth for from 2 to 3 days until epithelium, mesothelium, nerves and fibroblasts were grown The Locke-Lewis solution was then entirely withdrawn and the tissue culture was completely covered with a loop full of one of the diluted drugs The effects of the 4 drugs were then studied in their various dilutions

It was found that dihydranol, in all the dilutions used, kills the tissue culture *in situ* In the higher dilutions it injures the cells first Later, the tissues adjust themselves to the new medium and develop fairly normal growths Emetine hydrochloride, in all the dilutions used, kills the tissue culture Yatren, diluted 1 1000, kills the tissue culture cells slowly In the higher dilutions there is only slight injury

The de Rivas mixture of glycerin and magnesium sulphate is slightly toxic to the tissue culture cells in the dilution 1 1000 but they soon adjust themselves and normal growth follows The higher dilutions do not affect the growth, though at first there is a slight shrinking of the outermost cells

TRICHINIASIS.—*Diagnosis.*—Eleven cases of *trichiniasis* are described by E. C. Reifstein, E. G. Allen and G. S. Allen (Am J M Sc 183 668 (May) 1932). The eosinophilia observed in these cases has been considered of diagnostic importance ever since 1896 Although it is a common finding, the authors point out very distinctly that it is not invariable, and many severe cases of trichinia infection have been found without the slightest eosinophilia In some instances, the increase in the relative numbers of eosinophiles

may not be present until 1 to 3 weeks after the infection. It has never been established that the degree of eosinophilia bore any relationship to the severity or course of the disease except possibly in the fatal cases. It has been observed that those cases presenting no eosinophilia during the acute stage of the disease are the ones to be regarded as most unlikely to recover.

In the authors' cases, a palpable enlargement of the spleen was an interesting finding. Years ago, when clinicians were confronted with the problem of a differential diagnosis between trichiniasis and typhoid fever, the absence of a palpable spleen was considered in favor of the former. At the time of the first examination of the 11 cases reported during the third week of the illness, only 1 palpable spleen was discovered. Because of the apparent recovery of the cases, they were not seen again for 5 months, at which time 7 of the 10 available cases exhibited a palpable spleen. Little explanation of the condition is given by the authors, but the hope is expressed that necropsy findings may offer a definite explanation for this phenomenon.

To the authors the usual picture of trichiniasis offered little difficulty in diagnosis. Most of the cases are seen in groups and a common source of the infection is soon discovered. The characteristic symptoms of gastrointestinal irritation, the fever, muscular pains, edema of the eyelids, and the eosinophilia are noted in the majority of the nonfatal cases when sufficient of the infected meat has been eaten.

The authors believe the early symptoms of nausea, diarrhea and vomiting are probably due to the mechanical irritation of the intestine at a time when the parasites are penetrating the mucous

membrane. The various types of abdominal pain are fascinating. Possibly the early cramp-like pain is due to the localized intestinal spasm.

There is considerable variation in opinion as to the presence of the parasites or embryos in the stools of the patients suffering with this infestation. Most observers agree that the adult parasites or ova are not to be found in the stools.

Treatment.—F. C. Aldridge (Am J M Sc 181 312 (Mar) 1931) describes an outbreak of trichiniasis in Pennsylvania. For treatment he suggests **purgation, enemas and convalescent serum.** He believes *prevention* lies in the destruction of the carcasses of hogs that die of any disease, even of pork scraps in the slaughter houses, the extermination of rats and mice and, most important of all, the thorough cooking of pork before human consumption.

PARATHYROIDISM, EXPERIMENTAL.—In chronic hyperparathyroidism, which may be produced in rats by repeated injections of parathormone, bone changes occur which justify a diagnosis of osteitis fibrosa, according to J. L. Johnson (Am J M Sc 183 761 (June) 1932), who reports the results of his experiments in rats. White rats, aged 6 to 12 weeks, were injected daily for periods of 10 to 43 days with parathormone in doses of 10 to 20 units. A Steenbock normal rat diet was given. Uninjected litter mates, as controls, remained well, whereas the injected animals developed, without exception, muscular weakness, hypotonia and skeletal lesions characteristic of osteitis fibrosa osteoplastica (von Recklinghausen), *viz*, a lacunar resorption of bone, with softening and deformity,

bending and multiple fracture The cortex and marrow of these bones were largely replaced by fibrous connective tissue containing numerous giant cells, and new bone osteoid tissue was also in evidence in numerous cases

The experiments support the conclusion that the cause of clinical osteitis fibrosa osteoplastica is an excess of the parathyroid hormone

In further experiments, irradiated ergosterol, in doses of 5 to 60 drops daily, was fed to young, white rats and puppies maintained in a chronic state of hyperparathyroidism by the daily injections of parathormone These animals were litter mates of others that developed osteitis fibrosa when treated with parathormone alone The resulting lesions of osteitis fibrosa were *more extensive* Vitamine D intensifies the disease produced by excess of parathyroid hormone and it is definitely contraindicated in osteitis fibrosa

PARTURITION.—LABOR PAINS.—Various methods have been employed in measuring uterine contractions N Temesvary (Zentralbl f Gynak 56 130 (Jan 16) 1932) describes a method which he perfected while working on the ecboic action of organic extracts He designates his methods as proctolocography, for he introduces a balloon (metreurynter) into the rectum This balloon, which he fills with from 80 to 100 cc of water, is connected with a Marey's drum and the latter's indicator with a hymographion The curves that are recorded with this apparatus indicate the time between the uterine contractions and the duration and character of each contraction The author emphasizes that it is a simple and harmless procedure. Although it records the character and the duration, it does

not, however, indicate the absolute intensity of each contraction When an ecboic is administered, it can only be observed whether the amplitude of the contractions increases or not However, the author attempted to modify his method so that it would indicate also the intensity of the uterine contraction and he succeeded largely, for instance, in 1 case his apparatus indicated that during a contraction the pressure on the balloon increased from 80 to from 85 to 87, but after an ecboic had been administered the pressure increased from 80 to 90, and up to 120, *i e*, the intensity of the contraction had increased more than fourfold The author is convinced that if allowance is made for a small margin of error, this procedure is a suitable method for measuring uterine contractions

PHYSIOLOGY.—Posterior Pituitary Gland in Parturition—Experiments dealing with the function of the posterior pituitary gland during labor have been performed by P E. Smith (Am J Physiol 99 345 (Jan) 1932) and by H Heller and P Holtz (J. Physiol 74 134 (Feb 8) 1932) Smith removed the posterior hypophysis in adult female rats and noted the effect on labor. The completeness of the ablation was verified by a microscopic examination of serial sections of the capsule of the pituitary gland and its contents In all cases some anterior lobe tissue also was removed, but a sufficient amount remained to maintain normal body growth and sex cycles Six of these animals were mated and subsequently bore litters Birth occurred at the usual time The evidence thus shows that in rats a secretion of the posterior pituitary lobe is not necessary either for the genesis or for the maintenance of the uterine contractions at parturition

However, Heller and Holtz concluded from their experiments that the oxytocic principle of the hypophysis is of importance for the function of parturition. These investigators claim that the loss of the hormone of the posterior pituitary gland caused by hypophysectomy is quickly amended by hypertrophy of the neighboring tissues. The results of their experiments indicate that not only an increase in the secretion of posterior pituitary hormone, but also an increased sensitivity of the uterus to the hormone probably occurs at the end of pregnancy and may be an important factor in determining the onset and progress of labor.

DISORDERS OF.—*Dystocia Dyspituitarism*—In the past year attention has been drawn to a form of dystocia described as the "dystocia dystrophia syndrome." E. L. Cornell (Surg Gynec Obst 53:707 (Nov) 1931) reported a case of dystocia adiposogenitalis dystrophia as did C. Mazer and L. Goldstein ("Clinical Endocrinology of the Female," W. B. Saunders Co., Philadelphia, 1932).

E. A. Daniels (J Obst and Gynec Brit Emp 39:573, 1932) reports 3 cases, referring to the condition under the term "dystocia dyspituitarism," and feels that in hospital cases the incidence runs from 3 to 5 per cent.

The dystocia pituitary patient presents a characteristic appearance. The woman is usually of short stature, her height may be from 5 feet to 5 feet plus a few inches; some may be under 5 feet. The head sits close to the chest, there being very little neck. There is a heavy deposit of fat around the pelvic girdle, and the hips are quite broad. The face is plump, and the chest and extremities are obese. The secondary sexual characteristics are, as a rule, well developed,

although the patient complains of sexual disturbances. The hands are small and chubby, but the fingers are not fat and sausage-shaped as observed in hyperactivity of the pituitary. The radius and ulna, and tibia and fibula are shortened, considerably out of proportion to the fairly normal lengths of humerus and femur. The unusual adiposity is the result of posterior lobe deficiency, and these patients gain in weight rapidly, particularly after 1 or 2 pregnancies.

The menstrual flow has been late and irregular in establishing itself at adolescence. These patients usually give a history of dysmenorrhea, amenorrhea, dyspareunia, sterility, with frequent miscarriages and abortions. Such patients tire easily, show hypotension with a slow pulse-rate, are of a psychoneurotic nature, and are subject to toxemias of pregnancy.

The vaginal introitus is very small. The pelvic floor does not give, and it shows very little elasticity. The vaginal cavity is small and the cervix is easily reached. The measurements are normal, and the Baudelocque dimensions may be exaggerated because of the heavy pads of fat. The diagonal conjugate is normal and there is no evidence of any type of contraction. The pubic ramæ are heavy and masculine, and the tuberosities of the ischia are thick and bulging.

The sequence of labor in these patients seems almost dramatic. The dystocia dystrophia patient commences in labor with good strong uterine contractions, which are very painful and are often suspected to be of hysterical nature. These persist in spite of the usual doses of sedatives. At the first examination, the amount of dilatation may measure a few centimeters and it is

amazing to find that after 15 to 20 hours of strong, consistent and painful contractions, the dilatation remains the same. Exact diagnosis of the fetal position is difficult to determine because of the heavy apron of abdominal fat. The position in Daniel's last 3 cases was left occipitoposterior and he does not recall anterior positions in this type of case. This confirms Cornell's experience.

Spontaneous delivery may occur, but is rare. The mother soon becomes exhausted, and these dystocia dyspneuticisms provide a high incidence of stillbirths and livid blue babies that die shortly after birth. Puerperal morbidity in the mother is very common.

The patient should be sent into the hospital and given a test of labor. If, after from 10 to 15 hours, at the most, progress is not being made, delivery by Cesarean section should be resorted to. The membranes rupture early, and procrastination should not be too long before resorting to abdominal section. A well-timed Cesarean section is certainly to be preferred to repeated attempts at delivery from below, with a strong possibility of losing the child and severely damaging the mother.

Placenta Previa.—Treatment—Placenta previa always affords an interesting field for investigation. H. L. Moskowitz (Am J Obst and Gynec 23 502 (Apr) 1932) analyzes 158 cases and calls attention to the fact that both maternal and fetal mortality can be considerably reduced if proper supervision of all bleeding cases is given early, while the patient is in good condition, rather than attempting to temporize too long. All vaginal examinations should be avoided, unless the attendant is prepared to treat the patient immediately, for it may result in severe hemorrhage difficult to control. Every effort should be

made to conserve blood and combat shock. If shock and hemorrhage are present, they should be treated first and labor induced if pains have not begun. Manual dilation of the cervix followed by version and extraction gives a high maternal and fetal mortality, and this form of treatment should be condemned. The routine insertion of a bag extra-ovularly in marginal and partial cases of placenta previa has given satisfactory maternal results and has lowered the fetal mortality considerably. Because of the high fetal mortality due to prematurity and prolonged bleeding, the mother should receive first consideration.

In all types of placenta previa following the expulsion or removal of the placenta, the uterus should be firmly packed with iodoform gauze so as to favor contraction and retraction of the uterus. Frequently, on failure to observe this rule, relaxation of the uterus will occur which will result in a serious and sometimes fatal hemorrhage from one to several hours postpartum. Blood transfusion is indicated in all patients who have a low red blood count, low hemoglobin, and a systolic blood-pressure below 90, following hemorrhage and shock. During the past 5 years since this procedure has been more definitely used as a prophylactic measure in antepartum, intrapartum and postpartum cases, not only have the maternal and fetal results improved, but the morbidity has been lessened and convalescence hastened.

In anatomic hemorrhages or in hemorrhages caused by tears following vaginal delivery in placenta previa, W. Kerwin (Zentralbl f Gynak 56 741 (Mar 19) 1931) recommends bilateral ligation of the uterine vessels through the vaginal wall. The method does not require special instru-

ments but only those that every obstetrician has at his disposal. By means of a large round needle, a strong catgut thread is introduced into the parametrium where the vaginal wall meets the cervix. The point of the needle is directed upward toward the uterus and comes out again through the vaginal wall 3 cm lower. The suture is tied, and the same procedure is repeated on the other side.

The vaginal wall remains unimpaired except for the opening at which the needle entered. The hemorrhage ceases immediately after the second ligation is completed. Nine women, who were threatened by death from severe hemorrhage, were saved by this method. Two of them have since had spontaneous deliveries. The method is suitable for the clinic as well as for obstetrics in the home.

Breech Presentation.—The principal factors which render it difficult to estimate the fetal mortality due solely to breech presentation and delivery are that about 25 per cent of these babies are premature or are macerated, that a large number of fetal anomalies inconsistent with life occur in this group, and that some cases are complicated by placenta previa. W E Studdiford (J A M A 99 1820 (Nov 26) 1932) discusses the management of a breech presentation at Sloane Hospital, New York.

In most of the series reported the mortality lies in the neighborhood of 10 per cent. The anatomic causes of death are well known and consist of intracranial, spinal, intraabdominal and other traumatic lesions. Such lesions are found in the vast majority of infants who die during or shortly after delivery.

In an effort to cut down the incidence of such injuries, 3 lines of procedure

have been followed. The first, and possibly the most important, lies in antepartum care. The second lies in the proper conduct of labor and a sound technic in delivery. Finally, there is a certain small percentage of cases in which a Cesarean section is indicated. Concerning antepartum care, the first point to be stressed is the importance of diagnosis. In women attending the Sloane Hospital antepartum clinic during 1926-1928, the breech presentation was not recognized in over 50 per cent of the cases before the patient was in labor. In cases in which there is any doubt after a careful examination, an x-ray is indicated. In known cases of breech presentation, repeated effort should be made to perform external version. The Sloane Hospital records from 1926 to 1928 show 106 cases in which external version was employed. Of these, 86 per cent were successful. This procedure should be attempted between the thirty-second and thirty-eighth weeks. The Trendelenburg position is a great aid in this procedure.

Careful attention should be paid to the size of the fetus. R W Mohler (Am J Obst and Gynec 23:61 (Jan) 1932) notes in his series that among primiparas 33 per cent of the babies weighing over 8 pounds were born dead, while among multiparas 25 per cent of the babies weighing over 8 pounds were lost. Among the cases at Sloane Hospital it was noted that in 16 per cent of the stillbirths among multiparas the babies weighed over 10 pounds.

If, after careful study of a case, the decision should be made to allow the patient to go through labor, every effort should be made to preserve the amniotic sac intact. For this reason, it is unwise to attempt any method of induction. It is well recognized that the breech is a

poor dilator and that much more efficient dilatation of the cervix occurs with intact membranes. An added reason for the preservation of the sac is to prevent prolapse of the cord. At Sloane Hospital, stillbirths and neonatal deaths were associated with premature rupture of the membranes in 30 per cent of the primiparas and in 42 per cent of the multiparas.

Short Umbilical Cord.—J P Gardiner (J A M A 98 598 (Feb 20) 1932) discusses delayed labor caused by a shortened or short umbilical cord. If there is a delay in labor due to a shortened or short cord with an interference in its circulation, there is a great probability that, unless at the first sign of fetal distress some action is taken, the child will not be alive at the end of labor. In an analysis of 750 consecutive deliveries, this cord complication occurred once in 35 births.

The usually accepted symptoms of cord complication are (1) an immediate recedence of the presenting part at the end of the uterine contraction, (2) a recedence accompanied by the passing of urine, (3) a gradual cessation of labor pains, (4) pain in the back; (5) a desire on the part of the patient to assume the sitting posture in order to exert more pressure in expulsion; (6) localized pain at the placental site, due to traction on the placenta and partial inversion of the fundus, (7) during the relaxation, the placental site remains depressed until the presenting part recedes enough for the fundus to resume its normal form.

In order to determine the amount of retardation caused by the slipping of the cord about the neck, a living child was placed on the scales with the cord coiled about the neck. It was found that the slipping of the cord about the neck

caused a loss of over 7 ounces. It can readily be seen that a half-pound retardation from the slipping of the cord in the first stage of labor may have a very definite effect.

Traction in shortened or short cords frequently causes neonatal asphyxia with its potential possibilities.

TREATMENT.—J P Greenhill (*Ibid* 98:1260 (Apr 9) 1932) made a comparative study of the effects upon labor of thymophysin and a 25 per cent U S P pituitary extract. Seventeen patients received injections of thymophysin and 23 cases received solutions of weak pituitary extract. The general impressions obtained from this study were as follows: no preparation containing pituitary substance should ever be given as a routine or indiscriminately to shorten labor. No pituitary preparation should be administered in the second stage of labor except on rare occasions.

Weak pituitary solution and thymophysin are seldom effective for the induction of labor.

Both 25 per cent U S P pituitary extract and thymophysin shorten labor in some cases when administered during the first stage. If these substances are used during this stage, they should be given only for a definite indication, *viz.*, uterine atony or some urgent reason for shortening labor and, then, only small doses should be given, *i e.*, 3 minims (0.18 c c) or less.

The 25 per cent U S P pituitary extract and thymophysin seem to give almost the same clinical results.

The addition of thymus to pituitary extract does not add any factor of safety to the use of pituitary. The clinical use of pituitary extract depends not on the preparation used, but on sound clinical judgment, time of administra-

tion, dosage and close observance of the behavior of the patient

Occasionally, weak pituitary extract and thymophysin, even in small doses, may do harm. Both have a tendency to increase the blood-pressure, both may result in incomplete relaxation of the uterus between pains, and both may produce irregularities in the fetal heart rate which, even if temporary, may, nevertheless, result in injury to a baby.

Induction of Labor at Term—J. M. Slemons (Am J Obst and Gynec. 23 494 (Apr) 1932) induces labor at term by rupturing the membranes, followed by the intranasal application of pituitary extract after the preliminary administration of castor oil and quinine. Each of these steps is a familiar procedure, used independently to bring on labor. Each proves quite satisfactory, when effective, but it cannot be predicted when it will be so. On the other hand, the 3 procedures employed in succession may confidently be relied on. Since the method runs counter to orthodox obstetric teaching, certain comments of a theoretical character are made briefly in conclusion. The author refers to the mechanism of cervical dilatation, which is ascribed, almost axiomatically, to the action of a hydrostatic wedge composed of the membranes and the amniotic fluid. This medium, it is assumed, transmits the force of the uterine contractions and pushes aside the cervical barrier of the birth canal. In the author's judgment, that hypothesis is disproved, as far as negative evidence can do so, by the course of labor following induction by rupture of the membranes. Deprived of the possible action of such a mechanism, 132 labors suffered no handicap with regard to the first stage and terminated successfully. Nor did the presenting part of the fetus

act as a substitute for the hydrostatic wedge. This contingency was kept in mind and excluded by careful, frequent rectal examinations during labor and by the later inspection of the infant's head, which presented merely the usual molding and but rarely a caput succedaneum. The development of cephalhematomas did not occur in a single instance.

Anesthesia.—A clinical study of the effects during parturition of sodium-iso-amyl-ethyl barbiturate, commonly called sodium amytal, was made on a series of 30 patients by H. S. Ruth and N. F. Paxson (*Ibid* 23 90 (Jan) 1932). More than two-thirds of the cases were primiparæ, making the study a reasonably fair test for a small series of cases.

After the cervix has reached a dilatation of from 4 to 6 cm, sodium amytal is administered intravenously. Only the maximum dosage to be employed is calculated and that by the maternal body weight, *vis*, 15 mg ($\frac{1}{4}$ grain) per kilo. ($2\frac{1}{2}$ pounds). No other effort is made to predetermine the dosage required.

The superficial surface over the vein selected is prepared as for any intravenous therapy and protected by sterile drapings. Ten cc ($2\frac{1}{2}$ drams) of a freshly prepared 10 per cent solution in a 10 cc syringe is injected at the rate of 0.25 cc. (4 minims) per 15 seconds or slower. The patient is requested to keep her eyes open. An assistant observes the blood-pressure readings. A severe blood-pressure fall would contraindicate further injection. Whenever the patient closes her eyes, she is requested to open them. The more difficult it is for the patient to open her eyes, the slower the injection is made. The injection is temporarily stopped when she will no longer respond. No more is administered until the arrival of the next contraction. If

this awakens the patient, 1 cc (16 minims) more is injected if she has a high tolerance for the drug and 0.5 cc (8 minims) if her tolerance is low. Again, the next contraction is awaited with the same course of action. As soon as 2 successive contractions have occurred, with the patient merely muttering softly to herself and not opening her eyes, the first administration is completed. The patient is now not only analgesic, but amnesic as well.

Based on their observations, the authors believe that sodium amytal injected intravenously has 2 disadvantages: (1) administration requires some technical skill and, therefore, the drug cannot be administered by a nurse; (2) it produces restlessness.

In comparison with other forms of obstetric analgesia, the authors state that this method of using sodium amytal intravenously in conjunction with nitrous oxide-oxygen presents the following advantages: an immediate positive action, accurate control of dosage, no deleterious effect on mother or child, no deleterious effect on labor if properly given, sustained effect over a considerable period of time, furnishes a satisfactory method of treating spastic cervix or retraction ring, and, gives definite rest in fatigue occurring during labor.

The authors, therefore, believe that sodium amytal is of definite value in obstetric analgesia, particularly during first and second stage of labor.

S. M. Dodek (*Surg. Gynec. Obst.* 55. 45 (July) 1932) reports on the effect of certain sedatives, anesthetics, and stimulants upon the uterus during labor by means of a new method for external hystero-graphy. Dodek advocates the use of sodium amytal as an excellent analgesic for oral administration, especially in multiparous patients, and with

inhalation anesthesia for delivery, finds that there is a practically painless confinement and childbirth. In the study of a series of cases, Dodek found that sodium amytal does not retard labor, in spite of the fact that with from 6 to 12 grains (0.4 to 0.8 Gm.) of the drug patients may rest or even sleep from 1 to 3 hours with no discomfort. He states that its value cannot be estimated too highly, and there is no evidence which points to any harmful effect upon mother or child.

The tracings by the hystero-graph show that sodium amytal has no depressing effect on the contracting uterus in labor, nor does it interfere with complete relaxation of the uterine musculature in the intervals between contractions. It seems to cause a very desirable relaxation of the lower uterine segment. The dilatation of the os is, therefore, more rapid than would ordinarily be expected, and consequently the contractions often become more intense, but not painful, under the influence of this hypnotic.

The dosage of sodium amytal used by Dodek was 9 grains (0.6 Gm.) orally upon admittance and within 15 to 20 minutes the patient was usually sound asleep, she may not even move during contractions. The average patient rests from 1½ to 2½ hours with this dosage, and when sleep becomes light, a subsequent dose of 3 to 6 grains (0.2 to 0.4 Gm.) may be given without hesitancy. Whenever it is considered desirable, ether-oil may be given rectally.

In a report on a study of sodium amytal and scopolamine in 100 unselected obstetrical cases, H. B. Nelson (*Am. J. Obst. and Gynec.* 23. 752 (May) 1932) calls attention to the fact that the combination of these 2 drugs causes complete amnesia, in the majority of cases, if given early. The com-

bination of sodium amytal and scopolamine saves general anesthesia and is far less expensive. It does not slow labor or affect the baby, it can be given late in labor without untoward effect, but is best given early. The patients sleep several hours after delivery. There is an appreciable fall in blood-pressure, no added postpartum hemorrhage, no respiratory or cardiac effect, and the amount of gas-oxygen and ether necessary at the time of delivery is markedly reduced.

A standard, safe initial dose of sodium amytal used by Nelson was 9 grains (0.6 Gm) for a patient weighting 130 pounds, followed in $\frac{1}{2}$ hour by $\frac{1}{100}$ grain (0.6 mg) of scopolamine (injected subcutaneously). For a patient weighing less than 130 pounds, he used 6 grains (0.4 Gm) of sodium amytal as the initial dose, and for those weighing over 190 pounds, he gave 12 grains (0.8 Gm). The group included 51 primiparæ and 49 multiparæ, and the method worked equally well in both types of cases, provided medication was started early enough in labor.

G. S. Littell (*Ibid* 22:741 (May) 1932) studied the effect of sodium amytal upon newborn babies whose mothers had received this analgesic either orally or intravenously and concluded that no injurious effect was produced upon the newborn child when the drug was given as an obstetric analgesic or anesthetic in the customary doses. In Littell's series of cases, 78 mothers (45 of whom were primiparæ and the rest were multiparæ) were given sodium amytal either orally or intravenously, and 71 mothers did not receive this medication. In the group receiving sodium amytal orally, the total dose varied from 1.62 to 0.18 Gm (25 to 3 grains) and the time of beginning medication varied

from 13 hours to 45 minutes before delivery, and in those receiving the drug intravenously, the total dose varied from 1.35 to 0.45 Gm (21 to 7 grains), the time of medication varying from 7 hours to 20 minutes before delivery. Nearly all patients received nitrous-oxide-oxygen anesthesia during actual delivery.

In an analysis of the observations on the groups of patients delivered with and without sodium amytal medication, there was found to be but little difference. In both groups there was an occasional complaint that the baby was aroused with difficulty at nursing time and nursed poorly. Littell found this condition during the first 3 to 7 days, about equally in the cases that had, and had not, received sodium amytal, but it soon corrected itself.

In the series in which sodium amytal was not given to the mother, 2 babies were slightly asphyxiated; 1 manifested symptoms of thymic enlargement (confirmed by x-ray examinations); and 18 babies required supplementary feeding. In the group delivered with sodium amytal, 3 babies were slightly asphyxiated; 2 had symptoms of an enlarged thymus (confirmed and treated by x-ray); 1 had a moderately severe intestinal hemorrhage, and 14 required supplementary feeding. The majority of the babies remained under observation in the hospital for approximately 14 days, and a follow-up showed all were developing normally.

Surgical Treatment.—**FORCEPS DELIVERY**—The incidence of instrumental delivery varies considerably, depending on the individuality of the physician and the conditions under which he operates. E. D. Plass (*J. A. M. A.* 99:1817 (Nov 26) 1932) discusses the difficulties and dangers of forceps delivery. A

reasonable cross-section of medical practice in this regard has been provided by a study of the records of 40,143 births in Iowa during 1930 and the first half of 1931, in which the method of delivery was specified. Forceps application was noted 2833 times, a rate of 7.1 per cent or 5.8 per cent of all operations. There were 11,063 hospital births with 1531 forceps deliveries, 13.8 per cent, as against 29,080 home deliveries with 1302 forceps deliveries, 4.5 per cent. The lower operative incidence in home practice was associated with a lower stillbirth rate, 2.45 per cent, than that obtained in the hospitals, 3.61 per cent.

The advantages accruing from forceps delivery largely concern the mother, since there is little acceptable evidence that instrumentation is, except in rare instances, advantageous to the child.

For the mother, the chief dangers are infection and laceration. Aside from superficial abrasions and temporary injuries, such as facial paralysis, the chief risk to the child lies in the possibility of intracranial hemorrhage resulting from the application of too great pressure or of its too sudden release. When macerated fetuses are disregarded, approximately 50 per cent of all stillborn children and those dying in the first week of life have macroscopic intracranial hemorrhages, while a considerable percentage of the remainder, recognized clinically under the term "asphyxia," have recently been shown by F. A. Hemsath and M. M. Canavan (*Am J Obst and Gynec* 23:471 (Apr) 1932) to have microscopic hemorrhages in the medulla. Altogether, then, a considerable majority of all stillbirths and neonatal deaths is due to bleeding within the skull. It is not yet clear just what part forceps may play in the production

of such bleeding, but available figures point to a definite increase in fetal and infant deaths when forceps have been used.

In Iowa, the stillbirth rate in all forceps deliveries has been 4.87 per cent, as against a rate of 2 per cent in spontaneous births. Plass agrees with the conception that sudden compression of the fetal head is more concerned with the production of intracranial injuries than is the slower compression of a carefully done forceps delivery. In fact, the risk from pituitary extract given to hasten labor or to avoid forceps application is probably greater than that involved in low forceps delivery.

PATHOLOGY, CLINICAL.—BACTERIOLOGY.—*Culture of Tubercle Bacilli.*—The work of H. J. Corper (*J A M A* 99:1315 (Oct 15) 1932) has been intimately associated with the advances made in recent years in the detection of tubercle bacilli in the sputum by cultural methods. He has recently described a method for growing small numbers of these organisms from suspected specimens that are negative on microscopic examination of stained smears.

Procedure—1. Place 0.5 to 1 c.c. of well ground-up or finely divided suspected specimens (sputum, tissue, etc.) in a sterile bacteriologic test-tube (6 x 5/8 in. or 6 x 3/4 in.), stoppered with a cork which has been sterilized by dipping the end to be inserted into the tube in hot sterile paraffin.

2. Add 0.5 c.c. of sterile citrated blood (1/10 volume of 3 per cent neutral trisodium citrate) or 0.5 c.c. of fresh yolk.

3. To the well-mixed specimen and nutrient add 1.5 to 2 volumes of 6 per cent sulphuric acid, which is intimately mixed by shaking.

4. Incubate at 37° C. for about 45 minutes (1/2 to 1 hour), shaking vigorously occasionally during this period.

5 Remove from incubator and neutralize acid by cautiously adding a volume of 13 per cent pure sodium bicarbonate solution containing 3 per cent pure glycerine previously determined adequate to neutralize the quantity of 6 per cent sulphuric acid used. Bromthymol blue, 0.04 per cent, is a satisfactory indicator, the correct color range being from a deep green-blue (pH 6.8) to a light blue (pH 7.4).

6 The tissue substrate is allowed to settle overnight in the refrigerator or the mixture can be centrifuged at low speed, decanting the supernatant liquid and leaving 0.5 to 1 c.c. above the sediment to facilitate shaking and making smears when required.

7 Shake to break up the sediment, stopper carefully and place in dark incubator at 37° C.

8 At weekly or biweekly intervals remove tube from incubator, shake well, and make smears on clean slides covered with a thin film of Mayer's albumin fixative.

9 Fix carefully with heat and stain according to the Ziehl-Neelsen technic for acid-fast bacilli, being careful not to wash off the smear during staining and decolorizing.

The bacilli usually occur in skeins and lumps and are readily recognized. The 6 per cent sulphuric acid destroys saprophytic acid-fast bacilli and contaminants. Corper states that these organisms have been found only twice in thousands of specimens examined, being easily differentiated by their ability to grow at room temperature and the rapidity of their growth on the ordinary poor nutrient mediums.

Clinicians have long been aware of the limitations of the stained smear of sputum as a means of detecting tubercle bacilli, but inoculation and cultural methods required facilities which rendered them unavailable as routine measures. The cultural method yielded 51 per cent positive results in single specimens of sputum which were negative on microscopic examination of the stained smear for acid-fast bacilli. The simplicity of the tissue substrate microculture enables it to be used by any physi-

cian who has a small incubator at his disposal and can stain smears for tubercle bacilli. It should unquestionably occupy an important place in the laboratory examination of suspected tuberculous material.

Stains.—GLYCERINE BACTERIAL STAINS—One of the most annoying occurrences which is too frequently experienced in every clinical laboratory where bacterial staining is performed as a routine procedure, is deterioration of dye solutions and precipitation of the dye in the bottle or upon the slide. This is particularly true of the dyes used in staining by the Gram method. F. M. Huntoon (*Am J Clin Path* 1:317 (July) 1931) recommends the use of glycerine as an adjuvant in this connection. In the proper strength it acts in the following manner: (1) as a preservative, helping to keep the dyes in solution; (2) apparently as a mordant in increasing staining values; (3) by clearing the background and giving clear microscopic pictures.

Gram Stain.

Glycerine Crystal Violet

Mix

3 per cent solution crystal violet in 95 per cent alcohol	15 parts
30 per cent solution glycerine in water	85 parts

Counterstain

Red—Mix 10 c.c. carbolfuchsin with 100 c.c. of a 25 per cent. solution of glycerine in water.

Brown-yellow—Shake 2 Gm. Bismarck brown in 100 c.c. of water and filter. To the filtrate add 30 to 40 c.c. glycerine and mix.

Technic.

- 1 Cover smear with glycerine crystal violet for 1 to 2 minutes. Wash in water.
- 2 Cover with Gram's iodine 1 minute.
- 3 Decolorize with acetone-alcohol (75-25) for few seconds until color practically gone. Wash in water.

4 Counterstain with either red or brown counterstain as above for 30 seconds Wash in water

5 Dry and examine

Stains for Tubercle Bacillus—The glycerine crystal violet solution described above may be used for staining tubercle bacilli in sputum The procedure is the same as that for carbolfuchsin, *i.e.*, steam 1 to 2 minutes (if accidentally boiled the stain does not precipitate as does carbolfuchsin), wash in water and decolorize by any of the standard methods Wash again and counterstain with Bismarck brown The tubercle bacilli appear as slender black rods against a yellow background and are apt to appear thinner and more beaded than when stained with carbolfuchsin

Glycerine Carbolfuchsin

Phenol, 5 per cent	75 cc
Glycerine	25 cc
Saturated solution basic fuchsin in	
95 per cent alcohol	10 cc

This stain may be used instead of carbolfuchsin or glycerine gentian violet for the primary staining

Glycerine Methylene Blue Counterstain

Glycerine, 25 per cent. solution in	
water	100 cc
NaOH, 1 per cent solution	1 cc
Saturated solution methylene blue	
in 95 per cent alcohol	10 cc

This mixture stains equally well or better than the usual Loeffler's methylene blue solution, contains only one-third as much dye-stuff as the latter and gives sharper microscopic pictures

CAPSULE STAIN FOR BACTERIA—J W Churchman and N V. Emelianoff (Proc Soc. Exper. Biol and Med 29 514 (Jan) 1932) have devised a simple method whereby a capsule-like structure may be readily demonstrated about many bacteria which are not ordinarily considered to have capsules

Technic—The smear is dried in air, is covered with 10 drops of Wright's stain, which is left on until it nearly, but not quite, evaporates to dryness At this point, the original blue color of the stain is replaced by a pinkish color, this occurs usually in 3 to 4

minutes Wash as rapidly as possible with Clark and Lub's buffer solution at pH 6.4 to 6.5 and again, rapidly, with distilled water Dry with a fan without blotting If the smear is washed before the stain evaporates, the capsule-like structure will not be stained This structure stains as a pink area surrounding the blue-stained bacterium and is itself limited by a definite membranous pink-staining periphery, on the outer surface of which precipitated stain is at times observed Outside this structure a clear zone is occasionally seen If the slide is stained too deeply, the whole organism appears purple and the different zones described above cannot be distinguished If the smear is not stained deeply enough, only the blue bacteria are seen, the capsule being unstained

By this method capsules have been demonstrated on the following known capsulated organisms *Diplococcus pneumoniae*, types 1, 2 and 3, *B anthracis* Koch, *Klebsiella pneumococcus* Friedlander In addition, the following "non-capsulated" organisms show similar capsules *B prodigiosus*, *B pyocyaneus*, *B subtilis*, R strains of *Diplococcus pneumoniae*, *Eberthella typhi*, *Erysipelothrix muriseptica* and *Escherichia coli*

Two minor difficulties are at times encountered (1) a precipitate of the stain at times produces a granular deposit which may make the background confusing; (2) evaporation of the Wright stain sometimes results in the formation of ring-like bodies which may resemble capsules but which are revealed by careful study to be artifacts

RETICULOCYTE STAIN—With the increasing realization of the significance of reticulocytes in normal hematopoiesis, reticulocyte counts are coming to be accepted as a more or less routine procedure in many clinical laboratories. E E Osgood and M M Wilhelm (Proc Soc. Exper Biol and Med 29.53 (Oct) 1931) describe a simple and

satisfactory method which may be used with either fresh or oxalated blood

Technic—Mix equal parts (5 drops are sufficient) of fresh blood or oxalated venous blood and a 1 per cent solution of brilliant cresyl blue in 0.85 per cent NaCl in a small test-tube. Allow to stand for 1 minute or longer, mix thoroughly, and make a thin smear. The count may be made when the smear is dry or the slide may be counterstained with Wright's stain. Count all the red blood cells and reticulocytes in an oil immersion field, continuing in this manner until 1000 red blood cells have been counted. In the case of high reticulocyte counts, 5 per cent or over, only 500 red blood cells need be counted. The counterstain is necessary for the preservation of the preparation for 48 hours or longer.

This method possesses many advantages. It is simple and convenient and gives higher counts than most of the other methods in common use. The stain keeps indefinitely and does not have to be filtered before using. The oxalated blood may stand for as long as 48 hours before the reticulocyte count is made. There is no danger of overstaining even if the smears are not made until 2 hours after the stain and blood are mixed. The reticulocytes are well stained and the red blood cells are not crenated or distorted in any way. The stained smears keep indefinitely if counterstained with Wright's stain. By this method the average reticulocyte count obtained in healthy adults is about 2 per cent. of the total erythrocyte count.

Typing.—**RAPID METHOD FOR PNEUMOCOCCUS**—With the increasing employment of specific therapy in pneumonia, the importance of developing available methods of pneumococcus typing soon became apparent. A satisfactory procedure which combines speed of performance with a reasonable degree of accuracy has been developed by M.

H. Brown (*Am J Pub Health* 21:669 (June) 1931). The procedure, as carried out by this investigator, may be outlined as follows:

1. A representative sample of sputum is obtained in a clean, sterile container, no preservative being added.

2. The sputum is washed at least 3 times by swirling the mass of sputum around in sterile salt solution contained in 3 separate Petri dishes. This procedure tends to remove extraneous microorganisms. The sputum is then thoroughly emulsified in salt solution, using a 5-c.c. syringe with a needle of large caliber. Inject at least 1 c.c. of the emulsified sputum into the peritoneum of a mouse through a small caliber needle.

3. In 3 hours puncture the peritoneum with a capillary glass pipette.

4. The surface of a clean glass slide is divided into 4 sections, using a glass pencil. On each is placed a small drop of the peritoneal exudate. On the first sector mix with a drop of sterile salt solution, spread thinly, and allow to dry. To the second drop of peritoneal exudate, add a drop of Type I pneumococcus agglutinating serum, diluted 1 to 10, spread thinly, and allow to dry. To the third, add a drop of Type II serum, diluted 1 to 10, spread thinly, and allow to dry. To the fourth, add a drop of Type III serum, diluted 1 to 5, spread thinly, and allow to dry. The films are fixed by passing the slide 2 or 3 times over a moderate flame.

5. Stain for 1 minute with basic fuchsin. This stain is freshly made by adding 10 c.c. of a saturated alcoholic solution of basic fuchsin to 90 c.c. of distilled water and filtering. The saturated alcoholic solution of basic fuchsin is made by adding 10 Gm of basic fuchsin to 100 c.c. of absolute alcohol. Methyl violet may be used instead but is not quite as satisfactory.

6. Wash with water, blot, and examine with the oil immersion lens.

Definite clumping of lance-shaped diplococci in one of the sectors denotes the type. Care must be taken not to be misled by the presence of Gram-negative cocci which tend to clump together or by clumps of staphylococci. The capsule may be quite distinct, par-

ticularly in the case of Type III pneumococci

It may occasionally be found necessary to repeat the peritoneal puncture after 4 to 6 hours, but usually the sputum is well digested within 3 hours. The results may later be checked by the standard macroscopic method if desired.

LIVER TESTS.—Standard for van den Bergh Reaction.—The van den Bergh reaction is generally recognized as the best method available clinically for the quantitative determination of bilirubin in blood serum or plasma. Because of the prohibitive expense of pure bilirubin, various agents have been used in an attempt to produce solutions of a color sufficiently like that of acetophenolazorubin to permit their employment as standards for the colorimetric determination of bilirubin. Great difficulty is frequently experienced, however, in making the color comparison. The substance most widely employed as a standard at the present time is a solution containing 2.161 Gm of anhydrous cobaltous sulphate in 100 c.c. of distilled water, corresponding to a 1 to 200,000 solution of bilirubin, which is the unit adopted by van den Bergh (0.5 mg per 100 c.c.). F. D. White (Brit J Exper. Path 13:76 (Feb) 1932) has recently devised a modification of this standard which is very satisfactory for routine use.

The new standard is prepared as follows:

One and three-tenths Gm of anhydrous cobaltous sulphate are dissolved in 50 c.c. of distilled water. To this is added gradually, with constant shaking and cooling, 40 c.c. conc HCl (sp gr 1.19), and the solution is made up to 100 c.c. with distilled water in a volumetric flask. As the acid is added, the color of the solution changes to a bluish-violet, gradually reverting to a more reddish-violet which is the permanent color. Because of

this gradual alteration in hue, the solution should be prepared at least 24 hours before using, this time being necessary for the development of the final color in maximum intensity.

The solution must be kept well-stoppered and out of contact with light, preferably in an amber bottle. Prepared in this manner, the standard is apparently stable and in repeated tests over a period of more than 3 months has invariably shown the same azorubin value. Furthermore, since the color intensity is proportional to the concentration of the cobalt salt, weaker or stronger standards can be prepared by dissolving the appropriate amounts of anhydrous cobaltous sulphate, adding 40 c.c. of conc HCl and making up to 100 c.c. with water. This, however, is not recommended, as the standard described above is entirely satisfactory for comparison with concentrations of blood bilirubin commonly encountered clinically.

TISSUES.—Rapid Digestion of Biological Material.—Digestion of organic matter and ashing must frequently be resorted to in the chemical analysis of biological material. Most of the standard methods are time-consuming and possess other disadvantages. A. Bolliger (Australian J Exper Biol and Med Sci 10:57, 1932) describes a procedure which is relatively simple and rapid, and which has proven very satisfactory for routine use. The principle of his method is as follows: the material under investigation is digested with perchloric acid, nitric acid and hydrogen peroxide, if a dry ash is required, the perchloric acid mixture is evaporated and, due to the decomposition, at a low temperature, of the ammonium perchlorate formed, a nitrogen-free ash is readily obtained.

Procedure.—Tissues are preferably cut into pieces less than 0.5 cm in size. About 1 Gm. of the dry material is mixed with 4 to 5 c.c. of 60 per cent perchloric acid in a large pyrex test-tube (1 x 6 in.) or in a small Kjeldahl flask. The mixture is brought to the boiling point over a free flame. As soon

as perchloric acid fumes appear the heating is interrupted and 1 cc of concentrated nitric acid is added carefully, drop by drop. Nitrous fumes appear, and in some instances foaming will make it necessary to shake the mixture well, in order to avoid loss of material. Occasionally, foaming will be so marked that it will be necessary to add a drop of caprylic alcohol.

When the reaction has subsided, the mixture is once more heated, and more nitric acid is added as previously. During this stage, the solution has a yellow-brown appearance, but on further heating it may become darker. In this case, more nitric acid must be added until, on continued heating, the mixture retains a clear yellow color. In order to obtain an almost colorless solution, it is advisable to add about 1 cc of 30 per cent hydrogen peroxide (superoxyl), drop by drop, followed by further heating and evaporation of part of the perchloric acid. If the solution is still not decolorized, this process has to be repeated until at least a light green-yellow color is obtained.

Undigested particles which may be still adherent to the walls of the vessel are dissolved by the perchloric acid fumes. On cooling, or after evaporation of most of the perchloric acid, crystals appear which, in the case of material rich in protein, consist chiefly of ammonium perchlorate. Due to the solubility of the perchlorates formed, the digest readily dissolves in water with the exception of potassium perchlorate, which requires 100 times its weight of water. Silica, occasionally present, settles out as a white precipitate.

If a dry ash is required, take either an aliquot of the wet digested material or less than 1 Gm of the dried material if much protein is present. After concentration of the wet digested material or after digestion of the substance, the remaining perchloric acid is evaporated to dryness. As soon as almost all of the perchloric acid has been evaporated, the ammonium perchlorate decomposes instantaneously. After some further moderate heating, a white ash is produced if no large amount of iron is present. By adding another 0.5 cc of perchloric acid and boiling for a few seconds, all the cations present are converted to perchlorates. The last traces of ammonium perchlorate and organic matter are decomposed by again evaporating to dryness.

Wet tissue requires less perchloric acid and

digests in a shorter time. 1 Gm of wet kidney tissue, for example, requires only 2 to 3 cc of perchloric acid and a correspondingly smaller quantity of nitric acid and hydrogen peroxide. 5 Gm of dried feces is satisfactorily digested by 20 cc of perchloric acid, 15 cc of nitric acid, and 5 cc of peroxide. Sufficient perchloric acid should be used to cover well the material to be digested or explosion may occur while heating over the flame.

If desirable, combustion may be effected by an amount of perchloric acid twice the weight of the dried material. Heat this mixture at water-bath temperature until the greater part of the material is liquefied, then adding concentrated nitric acid slowly, the total quantity used being 2 to 4 times the volume of perchloric acid. If no further vigorous oxidation occurs after adding nitric acid at water-bath temperature, digestion is completed over a flame.

In digesting easily digestible material, such as spinal fluid, blood filtrates, or normal urine, which contain only moderate amounts of organic matter, only a small quantity of perchloric acid is required. One cc is enough for the satisfactory and speedy ashing of 10 cc of normal urine. The addition of nitric acid or hydrogen peroxide accelerates the process. One cc of 60 per cent perchloric acid suffices for 1 cc of blood serum, while 1 cc of whole blood requires 1.5 cc of perchloric acid and, at times, nitric acid and peroxide. In the case of very stubborn material, it is advisable to add nitric acid and peroxide alternately.

The time required for 1 cc of whole blood varies from 5 to 10 minutes, depending upon whether or not a dry ash is desired. 1 Gm. of wet liver or similar tissue requires about 10 minutes, while 1 Gm of dried tissue or feces requires 10 to 20 minutes. This procedure, if carefully carried out, is harmless, and produces satisfactory results more quickly than any other reliable method. Furthermore, the digestion with perchloric acid can be carried out in ordinary pyrex glass, whereas ashing with alkalis requires special vessels. In general, most of the cations present as

perchlorates after such digestion lend themselves conveniently to quantitative analysis

Demonstration of Copper.—The significance of the part played by copper in the pathogenesis of cirrhosis of the liver has received serious consideration in the past few years. F B Mallory and F Parker, Jr (Am J Path 7:365 (July) 1931) believe that copper is deposited in young liver cells in combination with some derivative of hemoglobin, forming yellow pigment granules (copper hemofuscin). In the course of weeks or months the copper disappears from the liver, appearing in the bile in demonstrable quantity and leaving behind a pigment which, for a time, may give no reaction for iron (hemofuscin). Both types of hemofuscin stain deeply with basic aniline dyes. Later, these pigment granules undergo a chemical change, as a result of which they give the chemical reaction for iron (hemosiderin). The necrosis of the liver cells, which eventually results in cirrhosis, is apparently due to the toxic action of copper and not to the mechanical effect of the presence of the pigments.

Technic—1 Fix thin slices of liver tissue in neutral buffered (pH 7.0) 10 per cent formalin for 1 to 3 days. Wash in running water for 24 hours and preserve in 80 per cent alcohol.

2 Stain frozen, celloidin, or paraffin sections in a freshly prepared, neutral buffered (pH 7.0) approximately 0.5 per cent aqueous solution of hematoxylin for about 1 hour. This solution is prepared by adding a little hematoxylin (as much as will cover the point of a small scalpel) to 10 c.c. of a mixture of monopotassium and disodium phosphate at pH 7.0. The color is a rich red.

3 Wash in several changes of tap water and allow to stand in water for 1 hour in order to render the blue color of the copper more distinct.

4 Dehydrate in alcohol, clear in origanum oil or xylol and mount in xylol balsam.

The copper in the pigment granules and inspissated bile is stained a light to dark blue, the iron being stained yellow-brown to brown-black.

Determination of Arsenic—Many methods have been proposed for the accurate determination of arsenic but most of them are laborious, time-consuming and not entirely satisfactory for clinical purposes. G E Youngburg and J E Farber (J Lab and Clin Med 17:363 (Jan) 1932) describe a procedure whereby arsenic is determined directly colorimetrically after oxidizing its sulphide. The organic material containing arsenic is oxidized with sulphuric acid, nitric acid and perhydrol and arsenic is then precipitated as the sulphide. This is in turn oxidized with sulphuric acid and perhydrol and a blue color is developed by the addition of molybdate and stannous chloride.

Method

Reagents

1 *10 N. Sulphuric Acid* 450 c.c. of conc H_2SO_4 (c.p. arsenic-free) are added to 1100 c.c. of water. This is titrated and diluted to make 10 N acid.

2 Molybdate-sulphuric Acid Mixture

Solution A Mix 50 c.c. 7.5 per cent sodium molybdate (c.p. phosphorus-free), and 50 c.c. 10 N sulphuric acid.

Solution B Mix 50 c.c. 7.5 per cent sodium molybdate (c.p. phosphorus-free), 25 c.c. water and 25 c.c. 10 N sulphuric acid.

3 *Stannous Chloride Solution* Dissolve 10 Gm. stannous chloride (c.p.) in 25 c.c. of concentrated HCl (c.p.). Store in brown, glass-stoppered bottle.

Dilute 0.5 c.c. of above stock solution to 100 c.c. with water. This solution may be kept for about a week or until turbidity develops.

4 *Standard Arsenic Solution* Dissolve 0.1533 Gm. of pure arsenic pentoxide in 50 c.c. of dilute sodium hydroxide (phosphorus-free). Neutralize with sulphuric acid and make up to 100 c.c. with water. One c.c. of this solution contains 1 mg. of arsenic.

From this solution, dilutions are made so that 1 c.c. contains 0.1 mg. and 0.01 mg. of arsenic. Preserve with chloroform. These solutions keep indefinitely.

5 *Perhydrol* 30 per cent hydrogen peroxide. Merck Blue Label Superoxyl is satisfactory. Keep in a refrigerator.

Procedure.—The following description applies to body tissues. Cut 50 Gm. (or less, dependent on the quantity of arsenic present and on the amount of tissue available) of tissue into small pieces, place in a 500-c.c. Kjeldahl flask, and cover with concentrated nitric acid. Add 10 c.c. of concentrated sulphuric acid, several silica pebbles, and several drops of caprylic alcohol. Heat, at first gently and then more vigorously, until the fumes from the sulphuric acid appear. Oxidation is completed by adding more nitric acid and perhydrol by drops (total about 15 c.c.). The contents of the flask are washed into a 50-c.c. Erlenmeyer flask, made up to 20 c.c. with water and cooled to room temperature. Hydrogen sulphide is passed through the cold solution for 5 minutes and the flask is then heated to 70°–90° C. while hydrogen sulphide continues to pass in slowly for an additional 5 to 10 minutes. The flask is stoppered and set aside overnight. The supernatant fluid is decanted and the precipitate is centrifuged and washed by centrifuging with 4 to 6 N sulphuric or hydrochloric acid 3 or 4 times, being washed finally with water.

The precipitate is transferred to a 150 x 20 mm. pyrex test-tube graduated at 10 c.c., 0.5 c.c. of 10 N sulphuric acid and a silica pebble are added, the tube is placed slanting partly over an electric hot plate or a small flame, and is heated at a boil until the water has evaporated and the acid begins to boil gently. The tube is then temporarily removed and, after allowing to cool for 30 seconds, 1 or 2 drops of perhydrol are added. The tube is then replaced and the heating is continued until oxidation is completed, more perhydrol being added if necessary. Any excess perhydrol must be removed by continued boiling for 5 minutes in order to prevent retardation of the subsequent color development.

The tube is allowed to cool, water is added to the 10-c.c. mark, and the contents are mixed. An aliquot (*e.g.*, 5 c.c.) is removed and kept for possible later use. To the remaining aliquot (5 c.c.) add enough 10 N sulphuric acid to make a total of 0.5 c.c. of

that acid and 2 c.c. of molybdate-sulphuric acid solution B.

The standard is prepared by transferring 5 c.c. 10.05 mg. arsenic of the standard arsenic solution to a similar tube and adding 2 c.c. of molybdate-sulphuric acid solution A.

To both unknown and standard, add 1 c.c. dilute stannous chloride solution and water to make up to 10 c.c., mixing without delay. Read in a colorimeter after 1 minute.

Calculation.—When employing a 5-c.c. aliquot and the standard is set at 20 mm.,

$$\frac{20}{U} \times 0.2 = \text{mg. As in 100 Gm. tissue}$$

While the modification of the Sanger method of oxidizing organic material is rather time-consuming, it is not unduly so, 50 Gm. of liver being usually completely oxidized in 1½ hours. Blood is used in the same manner as solid tissues. The blue color which is developed is about 0.4 as intense as that produced by phosphorus. The color fades slowly and the influence of temperature on its development is so slight that it can be ignored. The test as outlined is not quite as sensitive as the Marsh test, but is equal to the Gutzeit and 250 times as sensitive as the Reinsch test, detecting arsenic in a concentration as low as 1 part in 10,000,000.

BLOOD EXAMINATION.—Determination of Inorganic Sulphur.—In recent years considerable interest has been evidenced in the perfection of methods for the quantitative determination of inorganic constituents of the blood. The estimation of inorganic sulphur has been suggested as a means of investigating renal functional efficiency. The following method is proposed by D. P. Cuthbertson and S. L. Tompsett (*Biochem. J.* 25: 1237, 1931):

Reagents.

- 1 Acetone
- 2 Trichloroacetic acid, 20 per cent solution in distilled water. The commercial acid is purified by distillation with benzidine.

3 Benzidine, 0.5 per cent solution in acetone, prepared freshly each day

4 Benzidine hydrochloride solution prepared as follows 2.0071 Gm benzidine hydrochloride are dissolved in 500 c.c. normal HCl, 1 c.c. of this solution is equivalent to 0.5 mg of sulphur and is used as a stock solution. More dilute solutions, suitable for use as a standard for the determination of inorganic sulphur in blood, being equivalent to 0.0025 mg, 0.005 mg, 0.01 mg, 0.02 mg, 0.04 mg, and 0.08 mg of sulphur, are prepared by making appropriate dilutions of the stock solution with normal HCl

5 Sodium nitrite (NaNO_2), 0.1 per cent solution, prepared freshly each day

6 Sodium hydroxide (NaOH), 15 per cent solution

7 Thymol, 1 per cent solution in 10 per cent NaOH

Method—To 2 c.c. of either blood, plasma, or serum, are added 6 c.c. H_2O and 2 c.c. of 20 per cent trichloroacetic acid. The mixture is well shaken and then either centrifuged or filtered. Since most filter paper contains traces of sulphate, wash first with dilute acid, followed by distilled water, and dry thoroughly in an oven before using. Place 25 c.c. of the filtrate or supernatant fluid after centrifugation in a 15-c.c. centrifuge tube. Add 5 c.c. of 0.5 per cent benzidine solution in acetone and mix well. Allow to stand $\frac{1}{2}$ hour, centrifuge, and remove the supernatant fluid. The precipitate of benzidine sulphate is washed twice with acetone, followed each time by centrifugation. The tube is then inverted over a sheet of filter paper until dry. The precipitate of benzidine sulphate is dissolved, in the centrifuge tube, in 1 c.c. normal HCl, employing heat if necessary. After cooling, 0.5 c.c. of 0.1 per cent NaNO_2 is added, followed in 1 minute by 25 c.c. of 15 per cent NaOH . After thoroughly mixing, 25 c.c. of the alkaline thymol reagent are added, and, after standing for 15 minutes, the mixture is compared with a suitable standard prepared at the same time.

Standard To 2 c.c. of one of the dilute standard solutions described above, in a test-tube, is added 1 c.c. of the NaNO_2 solution. Allow to stand for 1 minute, add 5 c.c. of 15 per cent NaOH , shake well, and mix thoroughly with 5 c.c. alkaline thymol reagent. For normal blood the lowest standard (1 c.c. = 0.0025 mg S) is satisfactory, but,

as a rule, if the approximate inorganic sulphur concentration is not known, the entire series of standards should be used.

Normally, the inorganic sulphur content of the blood varies from 0.1 to 0.5 mg per 100 c.c. In renal disease this value is usually increased coincidentally with the increase in urea nitrogen. Sulphate retention appears to be proportionately greater in minor degrees of nitrogen retention than in more advanced grades.

Low Plasma Protein Content.—As a result of extensive investigations carried on during the past few years, the relationship between certain forms of edema, i.e., that seen in nephritis, nephrosis, diabetes and in malnutrition, and plasma protein deficiency has been definitely established. It has been found that there is a critical level of the plasma protein concentration above which there is usually no tendency toward the development of edema and below which such tendency is constantly present. This critical level is about 5.3 Gm. per 100 c.c., accompanying a plasma specific gravity of about 1.023. The determination of this factor is of importance in differentiating between "hydropic" types of edema, as mentioned above, and "nonhydropic" types, such as the edema of myocardial failure.

I. H. Page and D. D. Van Slyke (J. A. M. A. 99:1344 (Oct 15) 1932) have devised a simple test to determine whether the plasma specific gravity is above or below the critical level, utilizing the familiar principle of observing whether a drop of plasma floats or sinks in another liquid of known specific gravity. The desired specific gravity (1.0235 at 20° C) is obtained by using monofluorobenzene (Eastman Kodak Co.) or a mixture of 1 volume of xylene and 2.06 volumes of monochlorobenzene.

The latter mixture has the advantage of being relatively inexpensive but must be kept carefully enclosed in a glass-stoppered bottle and tested from time to time by known solutions of 1.0235 specific gravity. The simplest of these is a solution containing 3.36 Gm sodium chloride in 100 c.c. of distilled water. A drop of this solution should float in the organic mixture and neither rise nor fall.

Procedure—The freshly drawn blood is mixed with heparin, 1 mg. per 100 c.c., or with oxalate, not more than 2 to 3 mg. per c.c., and is centrifuged. The clear plasma is dropped from a pipette held about 2 cm. above the level of the fluorobenzene or xylene-chlorobenzene mixture. If the plasma specific gravity is below that of the fluid, the drop will rise rapidly to the surface, if the plasma specific gravity is higher, it will fall rapidly to the bottom, plasma just at the critical level will bob around if the tube is gently agitated, and, after a short time, the drop flattens on the side or bottom of the tube.

This simple procedure constitutes a means of rapidly evaluating the part played by alteration in the plasma protein level in the pathogenesis of edema. It is of particular value in the study of cases in the absence of laboratory facilities for the chemical determination of the plasma protein concentration.

Sedimentation Test in Gynecology.—W. A. Simunich (Am J Obst and Gynec 23:724 (May) 1932) observed an increase in sedimentation speed of 60 minutes or less in more than 50 per cent of 150 cases of inflammatory adnexitis and uncomplicated and complicated fibroids and carcinomas, and in about 23 per cent of other abdominal and vaginoabdominal pathologic conditions not of an inflammatory nature. The presence of virulent organisms is one of the most important causes of postoperative morbidity and mortality,

but a doubtful or positive virulence test does not depend on the speed of sedimentation. The increase in sedimentation speed is due to some other factor than the virulence of organisms. The sedimentation test is not a reliable guide in the determination of the time for safe operation of adnexal disease. The Ruge virulence test is of value in the prognostication of postoperative morbidity and mortality if the operation takes place at the site of the organisms, usually the cervix. The author believes that the history, the leukocyte and differential counts, the temperature and the physical examination must remain the main guides in the determination of the time for safe operation in adnexal disease, while in cervical and combined cervico-abdominal operations, the Ruge virulence test contraindicates cervical operations until such time as the test becomes negative.

CEREBROSPINAL FLUID.—**Determination of Protein.**—The quantitative determination of protein in cerebrospinal fluid is being widely practiced as a more or less routine clinical laboratory procedure. J. B. Ayer, M. E. Dailey and F. Fremont-Smith (Arch Neurol and Psychiat 26:1038 (Nov) 1931) have modified the original method of Denis and Ayer so as to obviate the necessity of employing a special colorimeter and of preparing a special standard for fluids of low protein content.

Technic—To 0.6 c.c. of cerebrospinal fluid in a test-tube are added 0.4 c.c. of distilled water and 1 c.c. of a 5 per cent solution of sulphosalicylic acid. The contents are mixed by inversion and, after standing at least 5 minutes, are read against a standard protein suspension prepared at the same time as the unknown. The standard is made by adding 3 c.c. of 5 per cent sulphosalicylic acid to 3 c.c. of a solution containing 30 mg. of protein per 100 c.c.

This solution is prepared as follows 20 c.c. of normal blood serum are diluted to 200 c.c. with 15 per cent sodium chloride solution in a volumetric flask. Filter. The filtrate is the concentrated standard. The total nitrogen of the filtrate is determined by the macro-Kjeldahl method, using 40 c.c. for the determination. The nonprotein nitrogen content of the undiluted serum is determined by the micro-Kjeldahl method of Folin, and this figure, divided by 10 (dilution of serum), is subtracted from the total nitrogen of the filtrate to obtain the protein nitrogen. The protein content of the filtrate, in milligrams per 100 c.c., is obtained by multiplying the value for protein nitrogen by the factor 6.25. The concentrated standard is then diluted with distilled water to make a diluted standard containing 30 mg. of protein per 100 c.c. of solution. These standards are preserved by adding a few crystals of thymol and keeping in a refrigerator. Prepared in this manner, no change in protein content has been observed in concentrated standards kept over a period of 6 months and dilute standards kept over a period of 12 months.

If the protein content of the cerebrospinal fluid is very high, the use of 0.6 c.c. results in too much turbidity to permit accurate comparison with the standard. Under such circumstances it is advisable to use 0.3, 0.2, or even 0.1 c.c. fluid and to add 0.7, 0.8, or 0.9 c.c. of water to make the volume up to 1 c.c. In cases with unusually high protein concentrations, a preliminary 1:10 dilution of the fluid may be made, and in cases with very low protein concentrations 1 c.c. of fluid may be employed without dilution. For the turbidity comparison the Bausch and Lomb-Duboscq colorimeter can be used with either 2 cm. or 5 cm. cups. The quantities stated above are suitable for use with the smaller cups. If the larger cups are used, larger quantities of fluid and reagents must be employed, *i.e.*, 1.8 c.c. fluid, 1.2 c.c. water, and 3 c.c. sulphosalicylic acid for the unknown, and 60 c.c. each of protein solution and sulphosalicylic acid for the standard.

The calculation is made as follows

$$\frac{\text{Reading of standard}}{\text{Reading of unknown}} \times \frac{30 \text{ (mg protein in 100 c.c. standard)}}{\text{c.c. spinal fluid used}} = \frac{\text{mg protein per}}{100 \text{ c.c. spinal fluid}}$$

With the standard set at 8 and with 0.6 c.c. of cerebrospinal fluid employed,

$$\frac{400}{\text{Reading of unknown}} = \text{mg protein in 100 c.c. spinal fluid.}$$

Normal values obtained by this method are considerably lower than those usually observed by the older method, being as follows: ventricular fluid, 5 to 15 mg. per 100 c.c., cisternal fluid, 15 to 30 mg. per 100 c.c., lumbar fluid, 20 to 45 mg. per 100 c.c. Considerable amounts of pigment do not materially affect the results but gross contamination by bacteria, sufficient to produce visible turbidity, naturally interferes with the determination. The procedure possesses the advantages of speed of execution (10 minutes), accuracy within 5 per cent of the true value, and the use of extremely small quantities of cerebrospinal fluid.

URINALYSIS—Estimation of Bilirubin—In the detection and quantitative estimation of bilirubin in urine by the application of the usual laboratory procedures such as the Gmelin, Fouchet and van den Bergh tests, difficulty is frequently encountered, particularly with the first two methods, in obtaining a definitely positive color reaction, especially with low concentrations of pigment. A Greco (*Diag. e tecn. di lab.*, Naples 2:925 (Nov. 25) 1931) has described a modification of the Daddi diazo reaction which may be utilized for the qualitative and quantitative determination of bilirubin in the urine. The procedure is as follows:

To 7 c.c. of absolutely fresh, acid urine, add 3 c.c. of a 10 per cent solution of barium chloride. Centrifuge and wash the precipitate several times with distilled water, centrifuging after each washing. To the washed precipitate, add 2 c.c. of a decinormal alcoholic solution of potassium hydroxide. Shake the mixture well for 1 minute and centrifuge

again. The supernatant alcoholic solution is decanted into another test-tube. To this solution, add 6 drops of freshly prepared 1:200 aqueous solution of Daddi's reagent (potassium isoparanitro-diazobenzol) and then 0.5 cc of concentrated sulphuric acid. In the presence of bilirubin, a red-violet color will appear promptly, becoming definitely purple within a few seconds and reaching a maximum intensity within 15 to 20 minutes. At the end of this time, a quantitative reading may be made by comparing the color with a suitable standard in a colorimeter. A positive reaction is obtained with dilutions of bilirubin as great as 1 part in 1,000,000.

PELVIC PAIN. — TREATMENT.—R. Fontaine and L. G. Herrmann, of Leriche's Clinic in Strasbourg (Surg Gynec Obst 54:133 (Feb) 1932), call attention to the fact that surgery of the sympathetic nervous system is of distinct value in relieving certain pelvic disorders in women. They believe that the hypogastric plexus carries the important pathways of sensation from the internal genital organs to the medullary centers and that the section of the superior hypogastric plexus (presacral nerve) above the hypogastric ganglion is a safe, simple and efficacious way of interrupting these pathways in the treatment of the functional type of *dysmenorrhea* as well as a method of relieving other forms of severe *pelvic pain*.

The cases in which pelvic sympathectomy is indicated, according to their views, can be divided into 3 main groups. *Group A*. Those cases in which no organic lesion of the genital organs can be found to account for the pelvic pain, *i.e.*, functional dysmenorrhea. *Group B*. Those cases with slight pathologic processes in the pelvis which do not react favorably to ordinary gynecologic treatment, *i.e.*, sclerocystic degeneration of the ovaries or persistent

pelvic pain following some previous operation. *Group C*. Those cases in which the pathologic lesion is known but which has been found to be too extensive for surgical removal, *i.e.*, inoperable neoplasms in the pelvis giving rise to severe pain.

They have performed resection of the superior hypogastric plexus for the relief of severe pelvic pain in 22 patients. Six of the patients have failed to return for follow-up examination, but at the time of discharge from the hospital they were completely relieved of their pain. One patient died on the second postoperative day, while 13 of the 15 patients that have been followed have been relieved of all pelvic and abdominal pain for periods of time up to 4 years. Two patients have had only slight or no benefit from the operation.

Technic.—The technic of the operation, as they describe it, is quite simple. With the patient in the Trendelenburg position, the small intestines and colon are packed upward toward the diaphragm and the rectosigmoid is retracted toward the left. The promontory of the sacrum and the two common iliac arteries are then located. The posterior parietal peritoneum is then incised at a point just above the promontory of the sacrum and directly in the midline. Immediately beneath the peritoneum and anterior to the midsacral artery will be found the nervous filaments which constitute the superior hypogastric plexus. In very thin women these fibers can be seen through the peritoneum, while in obese women the plexus is usually embedded in adipose tissue. If the mesosigmoid is short, care must be taken not to injure the inferior mesenteric vessels. Frequently, several nerve fibers are densely adherent to the right iliac vein. After all the

filaments have been isolated, a segment, at least 1 inch long, should be resected from each main nerve fiber in order to prevent any possible regeneration. The posterior peritoneum is then closed by a continuous catgut suture.

[NOTE—Especially is a pelvic sympathectomy of value for the excruciating pain that is sometimes associated with inoperable neoplasms in the pelvis. Severe pain, however, is often not present even in advanced cases. Pelvic sympathectomy for dysmenorrhea is entirely too radical in the editor's opinion.—Ed.]

PEMPHIGUS, CHRONIC.—

Uncomplicated recovery in all of the 6 cases treated with viosterol during the past 2 years, is reported by J. B. Ludy and C. M. DeValin (*Urol and Cutan Rev.* (Dec.) 1932). Three of these cases were of the severest type. In 1 case a dosage as high as 45 c c (1½ ounces) daily, continued for 3 weeks, was necessary to control the eruption. In the other cases, 12 c c to 32 c c (3 to 8 drams) of viosterol daily sufficed.

A review of 34 original case histories of this disease treated by other methods showed a mortality of 98.2 per cent., the single case in this group to recover being a patient treated with yeast and a diet rich in vitamins.

Evidence that chronic pemphigus is a deficiency disease rests upon the facts that 6 cases responded quite promptly to vitamin therapy, that all of these cases had histories of faulty diet, that the disease occurs principally amongst the poor and undernourished, and that in 61 cases there was a seasonal incidence in late winter and early spring, when fresh vegetables and fruits are least available.

Cases taking the highest doses of viosterol were repeatedly x-rayed for

evidence of calcium deposits in the soft tissues. None was found. No common characteristic blood chemistry was demonstrable. The Pels-Macht phytopharmacologic test was not available. The case receiving 45 c c (1½ ounces) of viosterol daily developed, after 3 weeks' treatment, slight mental aberration, with abnormal sexual excitation and persistent priapism. These symptoms subsided when viosterol was withheld for 4 days and a lower dosage then administered (12 c c—3 drams—daily) throughout convalescence.

Chronic pemphigus is a rare disease with a very high mortality. It is believed by the authors that 100 per cent recoveries in the small series of cases (6) reported by them justifies the exhibition of large doses of viosterol with the expectation of favorable results. Local and supportive measures should also be employed.

PENIS.—ANOMALY.—One of the most unusual anomalies has been reported this year by Seth and Peacock (*Urol and Cutan Rev.* 36:590 (Sept.) 1932), i.e., a case of double penis, and writers review a number of cases that have been seen. In 1609 the first case was reported and 16 cases were collected in 1926 by Brunı. In 1908, in addition to a case personally observed, Heller found reports of 22 cases, making 23. Since then, Leonti and McLennan bring the total up to 28. This case is apparently the twenty-ninth.

The examination was negative, except the external genitals, which consist of 2 penes lying side by side. The right one was attached at the midline at the normal site. It was 8 cm in length and 7.5 cm in circumference when flaccid. It had a foreskin and was normal in every respect except for a slight hypo-

spadias The root passed beneath the symphysis and into the perineum The second, or accessory organ was attached at the base 0.5 cm to the left of the other, and was somewhat smaller. It was 5.5 cm in length and 6.5 cm in circumference It had no foreskin, giving it the appearance of having been circumcised The glans was well proportioned, but meatus was suggested by a dimple The corpora was well developed but there was no urethra The root was attached to the symphysis.

The patient is normal mentally and has no sex psychosis He has refrained from marrying but has a desire to do so and have children He desires the amputation of the accessory penis.

PEPTIC ULCER. — GENERAL CONSIDERATIONS. — After considerable study of the problem, J. A. Ryle (Lancet 1:327 (Feb 13) 1932) has come to 4 major conclusions regarding duodenal ulcer (1) duodenal ulcer is a prevalent disease, and there is evidence (although due allowance must be made for growth and concentration of population and improvements in diagnosis) that this prevalence waxes rather than wanes under the existing conditions of civilized life (2) Although the mortality of its most serious complication has been remarkably diminished by surgery, duodenal ulcer continues to take its toll and remains, through painful dyspepsia and occasional hemorrhage, a serious cause of disability and lost efficiency among members and classes of the community often endowed with energy and usefulness above the average and sometimes with outstanding ability. (3) Although of all the dyspeptic disorders duodenal ulcer presents the most clear-cut clinical picture, its leading characters and nat-

ural behavior are not so widely appreciated in the profession as they might be. (4) Duodenal ulcer has supplied a number of problems in etiology, prognosis and treatment which are at present only partially solved

To these general conclusions, the author has added the results of his experience with 261 cases Regarding *etiology*, the matter of constitution and heredity must be considered as must age and occupation The usual ulcer individual is an energetic person of either slender or stocky build, between the ages of 30 and 50, most often in an occupation entailing irregular meals and responsibility Tobacco, focal infection, environment, climate, season and mental states all may have etiologic significance

Available figures as to the *mortality* of this disease are not reliable due to difficulty in establishing criteria for diagnosis Judging from the author's experience at Guy's Hospital, the mortality is about 7 or 8 per cent

The *symptoms* of duodenal ulcer are somewhat variable, but a careful history will often suggest the diagnosis Pain is an almost constant factor The author analyzes the pain in each case as to character, severity, situation, localization, paths of reference, duration, frequency, special times of arrival and aggravating and relieving factors Usually the pain is not severe, but if pancreatic erosion occurs, morphine may be needed Typically, the pain is "gnawing" in character, localized in the epigastrium, referred to the back if the pancreas is involved; occurs 2 to 3 hours after meals, relieved by food, often occurring 2 A.M.; aggravated by fasting, worry, fatigue, cold and sometimes by smoking; relieved by food, drink, warmth, rest, peace of mind and

alkalis Heartburn, nausea and vomiting may occur Objectively, there may be but few signs Deep circumscribed tenderness and muscle guarding are not uncommon

Hemorrhage and perforation, cicatricial stenosis and anchorage of the ulcer base to the head of the pancreas are the important *complications*, according to Ryle, to which he adds the unsuccessful gastroenterostomy Hemorrhage occurs in about 25 per cent of the recognized cases It is more serious in older patients with long histories, since large vessels may be involved Pyloric stenosis is indicated by retentive vomiting and occasionally by visible gastric peristalsis The author points out that in one-third of his stenotic cases sulphuretted hydrogen was eructated In 3 of 24 cases there were symptoms of alkalosis or "gastric uremia." Treatment with alkalis is contraindicated in the presence of organic stenosis and renal deficiency, according to Ryle (*Ibid*).

Twelve cases of anastomotic ulcers following gastroenterostomy are included in the series The author believes that the majority of these patients were unsuitable for surgery, either because of the strong "ulcer diathesis," or because of lack of definite surgical indications In general, the author favors *prolonged medical care* since "whereas a surgical failure often leaves the patient in a far worse plight than before, the same cannot be said of medical failures" Surgery does not guarantee against perforation or hemorrhage Ryle's *criteria for surgical treatment* are. "Pyloric stenosis; in cases of long standing Duodenal ulcer in which clinical history, x-rays and test meal proclaim gross scarring or anchorage and a tendency to slow transit of food without serious stasis and in which there

has been recurrence in spite of one or more strict courses of medical treatment, in cases presenting the syndrome of anchorage to or erosion of the pancreas; and in cases of concomitant duodenal ulcer and duodenal ileus" He opposes surgery in "youthful cases, in nonobstructing cases with short histories and adverse pedigrees or not previously accorded a strict medical treatment, in cases with recent hemorrhage, lacking other complications and in cases in which x-ray and test meal show gastric hurry"

D M Dunlop and R M Murray-Lyon (Edinburgh M J 39 571 (Sept) 1932) collected 181 cases of peptic ulcer, all giving either a typical history with hematemesis or melena, or a persistent definite lesion by x-ray All cases were observed for at least 1½ years No differentiation was attempted between gastric and duodenal ulcers The ratio of male to female was 652 to 348 It was found that while the average age of admission to the hospital was 40 years, the average duration of symptoms was 7 years (see Table I)

Several factors were considered of importance etiologically Occupation necessitating irregular eating habits apparently plays some part, since only 37.8 per cent of the male cases had regular hours of eating Hyperacidity was found to be the rule, being more marked in males (71.3 average) than in the females (53.3 average) It was found also that gastric ulcer and hematemesis were more common in the female, although melena was about equally common with the two sexes As a diagnostic criteria, x-ray was not found to be entirely infallible, since in 12.4 per cent of cases, many proved by operation, the x-ray evidence was entirely negative.

TABLE I
181 DEFINITE ULCER CASES

	Male	Female	Male and Female
Sex distribution	65.2%	34.8%	100.0%
Age on admission in years	38.5	43.5	40.3
Age at onset of symptoms in years	32.2	34.5	33.1
Duration of symptoms in years	6.3	9.1	7.2
Total acidity (c.c. N/10 NaOH per 100 c.c.)	71.3	53.3	65.5
Alcohol	55.7%		
Tobacco	84.8%		
Septic foci	51.9%	34.6%	47.6%
Regularity of meals	37.8%	96.1%	
Hematemesis	42.4%	63.5%	49.7%
Two or more hematemeses	19.5%	38.3%	25.9%
Melena	51.3%	50.8%	51.1%
Perforation	12.7%	4.8%	10.0%
Hour-glass stomach	0.0%	11.1%	3.9%
Pyloric stenosis	16.9%	17.5%	17.1%
Radiologically definite lesion	58.9%	71.4%	62.8%
Radiologically suggestive	28.5%	16.7%	24.8%
Radiologically negative	12.6%	11.9%	12.4%

All cases were treated medically at the beginning with a modified Sippy diet, large doses of alkalis and rest in bed. The average hospital stay was 4½ weeks. Twenty-seven per cent of the patients required surgical treatment, usually on account of obstructing lesions. There were 12 deaths, 4 from hematemesis, 4 postoperatively, and 4 from perforation. Sixty per cent of cases were followed for late check-ups. Results are given in Table II.

TABLE II
RESULTS OF MEDICAL TREATMENT ONLY

	Cured, Per Cent	Improved, Per Cent	I S Q, Per Cent
Definite ulcers	48.7	28.9	22.4
Indefinite cases	46.9	34.7	18.4

RESULTS OF MEDICAL AND SUBSEQUENT
SURGICAL TREATMENT

Definite ulcers.	59.8	31.5	8.7
Indefinite cases	59.2	40.8	..

An analysis of the duration of symptoms previous to treatment and the re-

sult of therapy showed that the longer the duration of the disease, the less satisfactory the treatment. (See Table III.)

TABLE III
DURATION OF SYMPTOMS AND RESULTS OF
MEDICAL TREATMENT

State Reported on Follow-up	Average Duration of Symptoms Be- fore Treatment, in Months.
Cases free of symptoms since treatment	58
Cases with slight symptoms	86
Cases with severe symptoms	104

It was further found that, contrary to the usual opinion, the lapse of time between treatment and follow-up had little to do with the percentages of cure or failure, since those followed over a long period gave as high a percentage of good results as those observed over a shorter period.

No definite evidence of benign peptic ulcer undergoing malignant change was found in this series. Only 1 case of alkalosis occurred.

In a review of recent opinions of *etiology and treatment*, A M Snell (Minnesota Med 15 86 (Feb) 1932) mentions various etiologic factors which may be concerned. The mechanical functional hypothesis, that certain portions of the stomach, mainly along the lesser curvature, are more subject to acute traumatic lesions, must be seriously considered. Constitutional factors have been described by Draper and others. The effect of gastric acidity has been widely discussed but no definite proof has been established that excessive secretion of gastric juice can in itself create chronic peptic ulcers. Normally, certain protective mechanisms apparently operate to reduce gastric acidity such as mucin secretion and duodenal and pancreatic regurgitation. Recent American views on ulcer, as outlined by Crohn, are that ulcer occurs in young subjects of vagotonic habitus, whose gastroduodenal mucosa is rendered vulnerable by vascular spasm, infection or trauma, and has been digested by the corrosive action of the gastric juice. Secondary factors such as vascular occlusion, local infection, and motor dysfunction then tend to make the lesion chronic.

German views are somewhat different, according to the author. Konjetzny and others have asserted that all gastroduodenal ulceration is accompanied by gastritis and duodenitis of varying degrees. For this reason the German teaching is resection for peptic ulcer to remove the chronically diseased ulcer beds in the tissue.

Medical treatment under rigid supervision is often satisfactory. Formerly, the Sippy plan or some modification was extensively followed. Recent additions include the use of gastric mucin, and nonspecific and specific vaccine

therapy. The latter has met with little support. As to *prognosis*, figures of cure of medical cases vary considerably (from 80 to 20 per cent), depending on the age, sex, duration of the ulcer, and the patient's economic condition. Surgical treatment is also difficult to appraise, although good results are believed to be obtained in 90 per cent by *gastroenterostomy*. Recurrence probably does not exceed 5 per cent, according to Snell. In parts of Europe and in one New York clinic partial *gastrectomy* is advocated. German surgeons claim good results in 85 per cent, with recurrences of less than 1 per cent.

ETIOLOGY.—1 *Environment and Constitution*—Inasmuch as man cannot be separated from his environment, investigation of his constitution must include the environmental factors. In G Draper's and G A Touraine's study of this question (Arch Int Med 49.616 (Apr) 1932), especially peptic ulcer, psychic as well as physical environment is considered. They accept the thesis that disease is simply the expression of maladjustment between organism and surroundings, an overthrow of the delicate structure, termed the "man-environment unit."

Gastroenterology, dealing with the stomach and intestines, is concerned with vital apparatus which is perhaps more than any other physiologic system exposed to blows from both ponderable and imponderable worlds. Physical, chemical and thermal onslaughts alternate with the rapid fire of emotions, such as fever, anger, jealousy and sexual confusions. Yet no two stomachs and no two intestinal tracts react similarly to any of these menaces. This is because the gastrointestinal tract is not the man, the whole man is the diges-

tive mechanism and as the whole man responds to the pressure of environment, so will any of his parts respond, for each cell and system within him is stamped indelibly with his special mark.

Investigation of ulcer families was carried out on the following lines (1) Genetic studies, (2) anthropomorphic studies, (3) anthropopsychic studies.

Genetic Studies—The ulcer families were represented by 26 males and 6 female patients and the gall-bladder families by 5 male and 27 female patients. In the ulcer patients' immediate family a sex distribution of 138 males to 100 females was found, while in the gall-bladder families the rate was 100 males to 130 females. Seventy-five per cent of the ulcer family were slender or medium, with 54 per cent of the gall-bladder families stocky or stout.

Among the immediate members of the patient's fraternity, studies showed that 35 males to 1 female expressed gastrointestinal weakness exclusive of the patient. The mothers showed the condition twice as frequently as the fathers. In the gall-bladder families females had digestive symptoms about 3 times as frequently as the males. Other diseases were represented as follows: Tuberculosis in 37 per cent of the ulcer families, pneumonia in 50 per cent, asthma in 25 per cent. Diabetes occurred in only 2 ulcer, but in 7 gall-bladder families, while gall-stones were reported in only 2 ulcer families as compared with 34 per cent in the gall-bladder families. No cases of goiter were reported in the ulcer families.

The genetic studies are summarized as follows:

"1 There is a tendency for the ulcer families to produce a preponderance of males and the gall-bladder families a preponderance of females.

2 Patients with ulcers are of families in which the tall thin type predominates as contrasted to the gall-bladder families in which the short thick type is in the majority.

3 There is a definite evidence in the ulcer families of a heredofamilial weakness of the gastrointestinal tract, 62 per cent of the families reporting such a history.

4 Gastrointestinal weakness is 3.5 times more frequent among males than among females in these families, and almost without exception it is found in thin people. Males of these families are also much less resistant to other diseases in the zone of the pneumogastric nerve (tuberculosis and pneumonia) than the females.

5 Diseases of a catabolic nature occur more frequently in ulcer families and anabolic diseases more frequently in gall-bladder families."

Anthropomorphic Studies—Table IV gives the results of detailed measurements in the various groups. From this and previous studies the authors have drawn the psychologic picture of the ulcer "race" (see Table IV).

"In our original interpretation of the total personality of the peptic ulcer individual, we concluded that both on morphologic and on psychologic grounds, maleness was the essential feature. Apparently, this thesis was further supported by the statistics of sex incidence of the disease. It is true that some observers report more female cases than male, and that today in Germany peptic ulcer is believed to be more frequent in females than in males. However, more recent publications undoubtedly give precedence to men. Thus, St. John reported in a series of 281 duodenal ulcers a sex ratio of 9 males to 2 females, among 87 pyloric ulcers, 5 males to 3 females, and among 104 gastric ulcers, 3 males to 2 females. A further reference to this descending ratio will be made later.

"Recently, however, while reading Crile's paper on the subject of recurrent hyperthy-

TABLE IV

	Peptic Ulcer, Mean	Gall-bladder, Mean	Range for General Population
Ponderal index	32.2	44.0	33-41
Gonial angle	122.5°	115.0°	118-127°
Subcostal angle	44.5°	62.0°	35-60°
Anterior index upper jaw	54.0	58.0	
Anterior posterior chest diameter	200.0	222.0	190-220
Anterior posterior diameter/chest length index	58.8	66.8	58-66
Lateral incisor/central incisor index	75.0	89.0	78-94
Hand index	45.8	47.2	44-48

roidism and recurrent peptic ulcer, certain questions arose concerning the validity of the male disease thesis which we have heretofore held. In that communication Crile pointed out that 60 per cent of patients with hyperthyroidism have digestive disturbances. He further called attention to the similarity of evidence of vegetative nervous system disturbance found both in patients with exophthalmic goiter and in those with peptic ulcer. Among these patients, for example, were widening of the palpebral fissure, fatigue, decrease of tissue and body fluid pH, sweating palms, and the subjective feelings of nervousness. He was able to show that when myxedema was produced, the acidity diminished. In 5 cases of peptic ulcer which had resisted medical and surgical treatment, he further demonstrated, by resection of the left suprarenal gland and part of the thyroid, that the acidity could be reduced to normal. In addition to these observations of Crile, it is commonly known that exophthalmic goiter and hyperthyroidism are from 6 to 8 times more frequent in women than in men. Similar suggestions are found in Simnitsky's work on the sympathetic nervous system. In view of these considerations, consequently, it would appear paradoxical that more men than women should be affected with ulcer. The only explanation for this paradox seemed to be in the fact of femaleness with the male.

"This disclosure led us to reexamine the literature and our own case histories and observations. We soon began to see the evidences of emphasis on the feminine character of body build which have been referred to, and further to discover in the psychologic structure similar but more marked and important characters. The violent impetuous behavior that we have viewed objectively and supposed to be the demonstration of virility, on deeper

psychologic investigation, turned out to be of quite a different nature. In the earlier literature on this subject of peptic ulcer, there are indications that a highly sensitive, feminine quality of temperament was recognized by certain observers. Thus, Gilles de la Tourette not only gathered statistics which showed in one series a ratio of 2 males to 1 female and in another series 1 male to 4 females, but in addition pointed out that there was a strong hysterical trend in the patients with ulcer and emphasized as a possible cause of ulcer the well-known vasomotor and trophic disturbances of hysteria. Charcot likewise suggested that the '*crise nerve*' or vomiting of blood might sometimes be hysterical. In referring to this point nearly 50 years later, von Bergmann declared that an ulcer often hides behind the '*crise nerve*' of Charcot. This same author, summing up the now generally accepted belief that a strong emotional factor contributes to the cause of ulcer, pleaded for the most finely drawn anamnesis and what he termed the '*subtle diagnose*'. He urged physicians not to be misled by the stolid men of the Holsteiner beneath which the tension of emotional conflict may be terrific."

The present study seemed to accentuate the fact that sexual characteristics play an important part in the make-up of the ulcer race. The authors previously had felt that fear was an outstanding characteristic of these individuals, but an analysis of the present series from a psychologic standpoint convinced them that the "androgynous mosaic" is a determining factor in most cases. An overabundance of femaleness in the

male creates "deep-rooted unconscious fears lest he fail in his attempt to play successfully the masculine role in life. In the female the mechanism is practically the same. If there is any difference, it is more in degree than in kind."

In summarizing, the authors state "It may be said that ulcer race families seem to produce a preponderance of males and that these males are of the tall, thin type. Furthermore, not only in their morphology but also in their psychologic make-up, they display a well marked emphasis on the feminine component of the androgynous mosaic. Fear, which is clearly an important factor in the digestive disturbance of the gastric ulcer race, is of 2 sorts. First, there is the chronic substratum of anxiety due to the person's constitutional sensitiveness to the threat of the female component. This is the elemental emotion which results in the masculine protest. Second, there is the acute or precipitating fear occasioned by the accident or insult which provides a transient menace to life, limb or ego."

"It would seem that the peptic ulcer race was composed of persons of definite constitutional type. These people possess qualities of soma and psyche which can easily be recognized. When the healthy balance of the man-environment unit is disturbed, symptoms in the domain of the sympathetic nervous system and the gastrointestinal tract develop. The 'man-environment unit' disturbance can often be corrected permanently by the use of appropriate psychotherapeutic methods. Analytic psychology at present seems to offer the best attitude of approach."

2 Gastric Secretion.—Many diverse agencies have been found capable of producing acute ulcerative lesions of the stomach and duodenum, according

to W. B. Matthews and L. R. Dragstedt (*Surg. Gynec. Obst.* 55: 265 (Sept.) 1932). The most likely factors which may delay healing and result in chronic lesions include the corrosive action of gastric juice, motility of the stomach, including disordered pyloric function, coarse food particles, general debility, endocrine disturbances, food deficiencies, etc.

In previous experiments Dragstedt and Vaughn showed that intestinal mucosa from any situation possessed resistance against digestive action of gastric juice providing the normal blood supply was not interfered with. However, these experiments made use of normal stomach contents which have less concentration of hydrochloric acid and pepsin than the juice obtained from Pavlov pouches in dogs. In the present study the authors connected various portions of the intestine with Pavlov pouches. It was found that in 17 of 19 animals so operated chronic ulcers developed. In the cases of anastomosis of the ileum, ulcers appeared in 100 per cent, while 85 per cent of the anastomosed jejunum cases developed ulcers. The shortest time observed for discovery of the ulcer was 14 days, the longest 160 days, the average being 67 days. There was practically always a strip of normal mucosa between the ulcer and the site of anastomosis.

The inference is made that the mucosa of various portions of the intestinal tract varies in its resistance to gastric juice. Lim, Ivy and McCarthy (1925) showed that although an isolated dog's stomach secreted highly acid juice, ulcers did not develop even over a period of years. However, this highly acid juice was not allowed to remain in the stomach for long periods of time. Matthews and Dragstedt report 1 case

of a large pouch which did develop a chronic perforating ulcer

Having found that pure concentrated gastric juice was capable of producing perforating lesions, the authors inquired into the mechanism of neutralization usually present in normal stomachs. Swallowed saliva was found to have little effect. To evaluate the importance of the neutralizing effect of ingested food, the authors tried the effect of sham feeding in dogs with esophageal fistulas. In spite of a copious "appetite" secretion of gastric juice, no ulcers developed. An operation was devised to produce gastric juice during the digestive phase of secretion in a stomach empty of food; in 1 animal so treated no ulcer had developed after an interval of 70 days. However, in this experiment, neutralization of duodenal secretions was not eliminated. By introducing a valve to prevent regurgitation of alkaline pancreatic and biliary fluid, a high percentage of jejunal ulcers occurred after gastrojejunostomy. Furthermore, it was found that in all dogs in which pancreatic fistulae were produced, duodenal ulcers resulted.

The authors further tested the Boldyreff theory of duodenal regurgitation by use of a one-way valve. After such an operation it was found that the gastric secretion as determined by test meal was increased, the level of free and total acid being higher and more prolonged. Acid introduced into stomachs of normal dogs was quickly neutralized in part; after operation the neutralization occurred much more slowly. Acute gastric lesions produced during the operation for implanting the duodenal valve showed delay in healing as compared with normals in 6 of 13 cases. Prevention of duodenal regurgitation further resulted in a higher incidence

of ulceration following gastric implantation of intestinal mucosa.

"The experimental evidence presented in this paper has been interpreted by the authors to afford substantial support to the view that the chemical action of pepsin hydrochloric acid (of the concentration found in pure gastric juice) can by itself alone produce a typical progressive ulcer in the stomach, duodenum, jejunum, ileum or colon. The resistance of these organs to the digestive action of pure gastric juice decreases progressively from the stomach to the colon. In the application of these findings to the problem of spontaneous ulcer in man, it should be emphasized that no evidence has been offered which contradicts the possible deterrent action of coarse food in the healing of acute lesions of the stomach or duodenum. Of these 3 factors operative in healthy individuals, however, the chemical action of the gastric secretion seems to be the most important both in the production of the acute lesion and in its subsequent chronicity."

3 Diet.—Diets deficient in *vitamine B* were fed to 64 rats and the stomachs studied grossly under serial section by G. Dalldorf and M. Kellogg (J. Exper. Med. 56:391 (Sept.) 1932). Twenty more animals received little or no *vitamine B*, 21 developed one or more gastric ulcerations. Twenty animals had larger amounts of *vitamine B* or were given a complete diet, none developed gastric lesions. Of 9 animals subjected to *vitamine B* depletion, followed by increasing doses after 40 days, 7 had gastric lesions. No gastric lesions were found in 6 animals given scant diets but just sufficient to prevent clinical evidence of deficiency. In the *vitamine B* deficient group 73 per cent developed ulcerations of the gastric mucosa.

The gastric lesions were not visible grossly. Most of the lesions apparently occurred along the lesser curvature, 3 were duodenal. Of the 74 observed lesions, 8 were chronic indurated ulcers resembling chronic peptic ulcer in man.

The effect of *protein starvation* in rats has been observed by F. Hoelzel and E. DaCosta (Proc Soc Exper Biol and Med 29:382 (Jan) 1932). In nearly all rats starved for varying intervals or given a deficient protein diet, ulcers developed in the prosthach. It was found that feeding of bran prevented ulcer formation, in spite of the increase in roughage. It was concluded that protein or other acid combining material was necessary to prevent ulcer in rats.

Neurogenic Factor.—Attention is called by Harvey Cushing (Surg. Gynec. Obst. 55:1 (July) 1932) to the relationship between peptic ulcers and the possibility of their origin from *disturbances of the cerebral centers*.

He reviews the familiar facts that: (1) "high strung" persons are particularly susceptible to "nervous indigestion" and associated ulcer, (2) that ulcers become symptomatically quiescent or even tend to heal when patients are put mentally and physically at rest, and (3) that symptoms are prone to recur so soon as the victim of the disorder resumes his former tasks and responsibilities.

The fact that gastric and duodenal ulcers have increased fourfold, whereas many maladies commonly seen in the wards remain stationary, is a matter which Cushing views as being probably associated with the stress and strain of modern life as compared with the placid existence of their forebears.

The author's attention was called to

the possible association of gastric ulcer following the loss of three patients, promptly after suboccipital craniectomy had been performed, due to acute perforating gastric ulcer. These cases are reported in detail. After the third instance, which followed a few months later, a direct connection was supposed to exist between the occurrence of this complication and operation for brain tumors.

Upon further search, the presence of small erosions in the gastric mucosa, with suspected vomiting of blood disclosed itself in several cases following the fatal termination in cerebral operations. Attention is called to the occurrence of such perforations of the gastric mucosa and malignant hypertension. Chronic ulcer, however, could be verified in only 1 case ascribed to an encephalic lesion, which proved to be a medulloblastoma in a child, filling the intraventricular system.

Cushing points out the substantiation of Rokitsky's views that such perforations may be of neurogenic source. Cushing reviews the experimental evidence in the production of ulceration by peripheral lesions of the vegetative nerves, and indicates that lesions which have led with the greatest consistency in the laboratory to ulcerative lesions, have either been paralytic on the part of the sympathetic nerves or stimulatory on the part of the vagus.

The production of areas of softening of the structures was noted by Schiff in 1845, after unilateral cerebral lesions were produced, involving the optic thalamus and adjacent cerebral peduncle in dogs and rabbits.

Keller noted perforations following experimental lesions on the brain stem. The important cell clusters in the hypothalamic region and tuberal area are

considered, with the sympathetic and parasympathetic responses (vagal responses)

As the summary and conclusions offered in this important article are of far reaching importance, they are quoted as follows

"The attempt to find a reasonable explanation for the acute perforative lesions affecting the esophagus, stomach and duodenum, which in 3 instances caused early fatality after operations for cerebellar tumor, has led not only to a review of the extensive literature on the neurogenic aspects of ulcer pathogenesis, but also to certain experimental observations that strongly suggest the presence in the diencephalon of a parasympathetic center. From this center, apparently tuberal in situation, fiber tracts pass backward to relay with the cranial-autonomic stations of midbrain and medulla, of which the vagal nucleus is by far the most important because of its influence upon the activity of the lungs, heart, and upper alimentary canal.

"Experimental lesions anywhere in the intracranial course of these fiber tracts from anterior hypothalamus to vagal center, presumably from parasympathetic stimulation (or possibly from vagal release due to sympathetic paralysis) are prone to cause gastric erosions, perforations or ulcers (Schiff, Ebstein, and others). Intracranial injuries and diseases affecting these same basilar regions of the brain are known to be accompanied by ulcerative lesions of the upper alimentary canal. It is certainly reasonable to believe, therefore, that the perforations following the cerebellar operations, forming the basis of this study, were produced in like fashion by an irritative disturbance either of fiber tracts or vagal centers in the brain stem

"Stimulation of the postulated parasympathetic center by intraventricular injection of pilocarpine or pituitrin, cause, in man, an increase in gastric motility, hypertonus and hypersecretion leading to retching and vomiting which ultimately contains occult blood. The same effects associated with observable patches of hyperemia of the gastric mucous membrane have been shown (Beattie) to follow direct electrical excitation of the tuber cinereum in animals.

"The active principle of the neurohypophysis (pituitrin) demonstrable in the tissues in the form of hyaline bodies, is known to find its way through the infundibular stalk to the region of the nuclear cell masses of the tuber, either by direct migration (Eddinger, Collin) or by the intermediation of blood sinuses (Popa and Fielding), and the secretory product may possibly pass between the ependymal cells to enter the cavity of the third ventricle (Herring, Cushing and Goetsch, Karplus and Pecznik). What is more, the secretion appears to be under the control of autonomic fibers that pass from the supraoptic nucleus into the posterior lobe. Hence, there is an anatomical basis for the presumption that posterior lobe extract (pituitrin) should have a stimulatory influence on the local vegetative nerve centers. That intraventricular pituitrin would cause a parasympathetic discharge with vagotonic effects, whereas, given subcutaneously its action resembles that of adrenalin, could not have been foretold.

"The interbrain has been shown (Cannon, Bard) to be the seat of primitive emotions which are normally under cortical control; but in experimentally decorticated animals, probably from release of the sympathetic nucleus in the posterior hypothalamus, there occur explosions of 'sham rage' accompanied

by a mass-discharge of the sympathico-adrenal system

"The parasympathetic apparatus, in all probability, under normal conditions is likewise strongly affected by cortical or psychic (Pavlov) influences. However this may be, direct stimulation of the tuber or of its descending fiber tracts, or what theoretically amounts to the same thing, a functional release of the vagus from paralysis of the antagonistic sympathetic fibers, leads to hypersecretion, hyperchlorhydria, hypermotility and hypertonicity, especially marked in the pyloric segment. By the spasmodic contractions of the musculature, possibly supplemented by accompanying local spasms of the terminal blood-vessels, small areas of ischemia or hemorrhagic infarction are produced, leaving the overlying mucosa exposed to the digestive effects of its own hyperacid juices

"Thus it is possible to reconcile the neurogenic theory of ulcerations sponsored by Rokitsansky and Virchow's variously modified theory of a primary local cause, whether the lesions are considered in terms of simple erosions, of acute perforations, of autodigestive softening, or of chronic ulcers, and whether they chiefly involve esophagus, stomach or duodenum

"Those favorably disposed toward the neurogenic conception of ulcer have in process of time gradually shifted the burden of responsibility from the peripheral vagus to its center in the medulla, to the midbrain, and now to the interbrain, newly recognized as a highly important, long overlooked station for vegetative impulses easily affected by psychic influences. So it may easily be that highly-strung persons, who incline to the form of nervous instability classified as parasympathetic (vagotonic)

through emotion or repressed emotion, incidental to continued worry and anxiety and heavy responsibility, combined with other factors such as irregular meals and excessive use of tobacco, are particularly prone to have chronic digestive disturbances with hyperacidity, often leading to ulcer—effects wholly comparable to those acutely produced by irritative lesions experimentally made anywhere in the course of the parasympathetic system from tuberal center to its vagal terminals

"While this conception of the etiology of ulcer does not account for all ulcerative processes under all conditions, it offers a reasonable explanation of the majority of them and is in accord with the personal experience of most victims of chronic recurring ulcer. This, briefly, is as near as one can come, with the data at hand, to an interpretation of the neurogenic origin of peptic ulcer and an explanation of its existing prevalence"

SYMPTOMS.—Gastric acidity and gastric hunger contractions have usually been cited as the cause of the *pain* in peptic ulcer, according to J Meyer, D Fetter and A A Strauss (Arch Int Med 50 338 (Aug) 1932). These authors investigated epigastric pain in relation to gastric motility and acidity in 22 patients, 12 of whom had duodenal ulcer and 2 gastric ulcer. To test the effect of acid, the test of Palmer was used. A record of motility was obtained by use of a balloon

Ulcer patients were found to fall into 2 groups: those who had pain with acid stimulus, but none related to motility; and those with no acid response, but pain during periods of motility. In analyzing the results, the authors believe that the acid sensitivity is due to an associated gastritis and hence is not present in all cases. "The same mechanism pre-

vails in cholecystitis, appendicitis and probably colitis" Hunger contractions and motility may produce pain in gastric and duodenal ulcer, the mechanism, according to the authors, being depletion of the vascular bed in and about the ulcerous area, resulting in asphyxia, edema and pain. The acid test is believed by the authors to be unreliable as a test for duodenal or gastric ulcer, since it may be positive in the other conditions mentioned above.

L R Dragstedt and W L Palmer (Proc Soc Exper Biol and Med 29 753 (Mar) 1932) had the opportunity of studying the pain mechanism in a patient with duodenal ulcer during operation. A puckered area about 1 cm distal to the pylorus was discovered on the anterior wall of the duodenum. Touching this area reproduced typical ulcer pain, as did traction. When 20 cc of 5 per cent sodium bicarbonate was injected into the pylorus, pain was immediately relieved for several minutes. Introduction of 20 cc of 0.5 per cent hydrochloric acid produced immediate pain. Following these procedures, the patient complained of severe cramp-like pain in the chest, and a sharp contraction ring was seen just distal to the ulcer, which gradually moved caudad, to be followed by other deep contractions. Previous peristaltic waves passing through the pyloric antrum had produced no pain.

COMPLICATIONS — *Alkalosis.*

—H L Bockus and J Bank (M. Clin North America 16.143 (July) 1932) reported detailed studies on 4 patients with alkalosis associated with duodenal ulcer. From a study of the literature and an analysis of these cases the following conclusions were drawn.

1. The development of alkalosis in duodenal ulcer is most frequently due to

depletion of body and blood chlorides resulting from vomiting in cases with some degree of pyloric obstruction. The blood chloride level is low, the carbon dioxide combining power of the plasma high, and urea nitrogen retention may be great. Symptoms of alkalosis may be absent except in extreme cases. The response to normal saline solution intravenously is usually prompt. "Alkalosis must be ruled out in all patients giving a history of persistent vomiting of large quantities of hydrochloric acid."

2 Other factors which may be responsible for the development of alkalosis in duodenal ulcer cases are alkaline therapy, kidney disease, the vomiting of blood and chloride privation from too strict a diet. The authors do not believe that any one of these factors is often important, but a combination may produce a serious degree of alkalosis.

3 Profuse hematemesis may be a serious complication and hinder response to treatment. Transfusion is advocated by the authors in all patients with alkalosis and duodenal ulcer who start to bleed.

4 The authors have not seen any cases of alkalosis dependent upon alkali administration alone. Other causes such as renal damages, anemia from bleeding, and pyloric obstruction have always entered into the picture.

5 All cases of duodenal ulcer should have studies to rule out kidney pathology before alkalis are administered, according to Bockus and Bank.

H A Rafsky, L Schwartz and A W Kruger (J A M A 99 1582 (Nov 5) 1932) treated 93 cases of peptic ulcer with alkalis. Sixty-one were given gradually increasing doses beginning with 50 grains (3.2 Gm) sodium bicarbonate, 20 grains (1.3 Gm) calcium carbonate and 12 grains (0.77

Gm) **magnesium oxide** daily. This dose was gradually increased so that by the end of 2 weeks the average doses were 160 grains (10.7 Gm) **sodium bicarbonate**, 35 grains (2.3 Gm) **calcium carbonate**, 12 to 20 grains (0.77 to 1.3 Gm) **magnesium oxide**. Later an average dosage to control symptoms was increased to 315 grains (21 Gm) **sodium bicarbonate**, 60 grains (4 Gm) **calcium carbonate** and 12 to 35 grains (0.77 to 2.3 Gm) **magnesium oxide**. Cases with allergy or renal disease were not subjected to the above plan, but were treated more cautiously.

Twenty cases were not given large doses of alkali and a third group of 12 patients were put on a strict Sippy plan, receiving an average daily dose of 385 grains (25.7 Gm) **sodium bicarbonate**, 95 grains (6.3 Gm) **calcium carbonate**, and 12 to 20 grains (0.77 to 1.3 Gm) **magnesium oxide**.

In none of the cases of the first group did alkalosis develop, either from laboratory or clinical findings. However, cases with renal disease or allergy were treated very cautiously and patients with pyloric obstruction or gastric atony were not treated in this group. Two of the 12 patients treated by the usual Sippy plan developed alkalosis. The authors believe that the method of giving alkalis in ascending doses to selected cases minimizes the chance of alkalosis occurring.

DIAGNOSIS.—The importance of close cooperation between roentgenologist and internist in making the diagnosis of gastric lesions is stressed by B. R. Kirklin and G. B. Eusterman (*Am. J. Surg.* 15:462 (Mar) 1932). From an x-ray standpoint, certain features may give an indication of the nature of the lesion. "Most niche ulcers are benign, and on a statistical basis such an

ulcer is presumptively not malignant unless atypical features are present. A sharply conical or irregularly contoured niche is suggestive of malignancy, the niche of a benign ulcer is usually regularly hemi-spherical. A simple ulcer more often has a dense clearly depicted niche, a malignant ulcer more often has a faintly shadowed ill-defined niche. Ulcers on the posterior wall, away from the lesser curvature, are more likely to be malignant than those on or near the lesser curvature. Ulcers on the greater curvature, while they are rare, are almost invariably malignant. Ulcers near the pylorus are more likely to be malignant than those distant from the pylorus.

"An ulcer with obliteration of the neighboring rugæ is probably malignant, an ulcer in the midst of exaggerated and converging rugæ is probably benign. Localized gastrospasm is a feature of benign ulcer. An ulcer accompanied by an incisura, antral spasm, a tightly closed pylorus, or spastic retention, is probably benign, a gaping pylorus, or absence of all spastic phenomena, suggests that the ulcer is carcinomatous. Active peristalsis speaks for simple ulcer, faintness or absence of peristalsis speaks for carcinoma." Malignant ulcers are seldom tender. Prepyloric lesions are difficult to identify. "Early scirrhus carcinoma, syphilis, prepyloric ulcer and hypertrophy of the pyloric muscle frequently produce exactly similar deformities."

Clinically, "the majority of benign gastric ulcers present the classical syndrome of ulcer, although not to the same degree and frequency that characterizes duodenal ulcer. About a fourth of all resectable carcinomas, ulcerating and otherwise, temporarily simulate peptic ulcer, especially at the onset, and more than half of all resectable carcinomatous

ulcers give rise to the same symptoms over a longer period of time" Carcinoma may be suspected by the occurrence of constant instead of intermittent course, lessening of a food relief, replacement of the usual pain in ulcer by a dull, more or less constant ache often made worse by food; loss of appetite and onset of nausea

Objectively, findings of importance are a decrease in gastric acidity, disturbance of motor function, anemia without gross hemorrhage, persistent occult blood in stomach and feces The appearance of ulcer symptoms and findings at an advanced age should always be regarded suspiciously Gastric analysis is of value, although the findings in early cases are less diagnostic than those found in late cancer "In more than 50 per cent of resectable lesions and in about 80 per cent of pathologically verified carcinomatous ulcers and small ulcerating carcinomas, free hydrochloric acid is present." However, hypochlorhydria or achlorhydria is noted in about two-thirds of all cases of carcinoma. In questionable cases a period of treatment may clear the diagnosis, and failure of relief and improvement by x-ray means cancer in about 60 per cent of cases. Distinction between malignant and nonmalignant tumors is often difficult

Clinically, the features which may aid are the low incidence of benign tumors (1 to 200), the scant or absent dyspeptic symptoms, associated with good nutrition, frequency of gross hemorrhage and anemia in benign tumors, normal gastric secretion; younger age group.

Syphilitic disease of the stomach is extremely rare and offers considerable difficulty in diagnosis Nonspecific ulcers and malignancy can occur in a

syphilitic patient independently of the systemic disease Actual luetic gastric disease is more likely to mimic cancer than ulcer All cases of gastric lesions in luetics should be temporarily considered as luetic until proved otherwise

The difficulty of differentiating early *gastric malignancy* from benign ulcer has been stressed by G W Holmes and A O. Hampton (J A M A 99 905 (Sept 10) 1932) The clinical history in early cases is of little value, the gastric acidity may be the same in both conditions, and cases of malignancy may seem to improve on ulcer therapy, according to these observers. An attempt was made to localize more definitely the ulcer-bearing areas of the stomach as an aid in differential diagnosis Orator, in 1925, studied 330 cases of gastric ulcer, 300 of which occurred in the middle third of the stomach near the lesser curvature, while 30 were in the prepyloric region. Histologic examination showed evidence of malignancy in 6 of 300 lesser curvature ulcers and 15 of the prepyloric ulcers, 15 others were questionable No benign ulcers were found on the greater curvature or in the fundus Sproul searched the literature to find only 10 proved cases of benign ulcers on the greater curvature Houdek stated that 80 per cent of gastric malignancies begin in the prepyloric region Ulcer is uncommon in this area, occurring about one-tenth as frequently as in the pars media He advised surgery in all prepyloric ulcerations

Holmes and Hampton studied records of 128 benign gastric ulcers from the Massachusetts General Hospital and established the following locations Questionable, 8 per cent; pylorus, 21.9 per cent., near pylorus, 4.6 per cent; prepyloric, 1.5 per cent; media, 74 per cent. From x-ray material alone, 128

TABLE V

INFLUENCE OF HISTORY OF GROSS HEMORRHAGE ON END-RESULTS

	One Hemorrhage Per Cent	Two or More Hemorrhages Per Cent
60 successful cases	13.4	1.6
47 cases unsuccessful	40.4	14.9
Because of pain (34)	23.1	2.9
Because of hemorrhage (13)	31.0	46.0
386 cases of duodenal ulcer	15.0	4.4

	No Hemorrhage	One Hemorrhage	Two or More Hemorrhages
Series of 386 cases followed 1 to 5 years	311	58	17
Successful	266 (83%)	42 (73%)	3 (18%)
Unsuccessful	45 (17%)	16 (27%)	14 (82%)

benign gastric lesions and 121 gastric carcinomas were obtained. The lesions were located as follows.

	Ulcer	Carcinoma
Pyloric end		
Pyloric	39	75
Prepyloric	6	
Media	80	17
Cardia	3 (?)	21
Diffuse	0	8
	<hr/> 128	<hr/> 121

The authors conclude that "any chronic indurated ulcerating lesion occurring in the pyloric antrum within 1 inch of the pylorus, but without involving the pylorus, should be considered malignant until proved to be otherwise, and that proof of the absence of malignancy in such lesions is obtained only by serial section and careful microscopic examination. Given a case presenting such a lesion in the prepyloric area, it is probably safer and wiser to treat the lesion by wide surgical removal than by medical or palliative treatment. The same is true of all chronic indurated ulcerating lesions occurring on the greater curvature, and probably with most lesions occurring in the cardiac end of the stomach."

J. A. Wilson and E. G. Earl (Minnesota Med 15:79 (Feb) 1932) have gone over the literature reporting cases of achlorhydria associated with peptic ulcer. The only case where test meals and aspirations failed to show free acid in benign ulcer was one of gastroenterostomy done for a previous ulcer. The authors report 2 cases of peptic ulcer associated with apparent achlorhydria, but which, on further study gave acid curves compatible with ulcer.

PROGNOSIS.—S. M. Jordan and E. D. Kiefer (Am. J. Surg 15:472 (Mar) 1932) review their experience with medical treatment of duodenal ulcer. There was a 9 per cent incidence of recurrences by the end of the first year, with a steady increase to 46 per cent by the end of 5 years. These patients were carefully treated by diet and a modified Sippy plan, with hospitalization for a period of 3 weeks. A careful search for foci and other abdominal disease was made.

Sixty cases of ulcer with unsatisfactory results following medical treatment were compared with 60 cases successfully treated in an attempt to evaluate the factors tending to failure. The

TABLE VI
VOMITING AND 6-HOUR GASTRIC RESIDUE

	Vomiting, Per Cent	6-Hour Gastric Residue, Per Cent.
60 successful cases	15	10
47 cases unsuccessful	36	30
Because of pain (34)	50	41
Because of hemorrhage (13)	0	0

TABLE VII
PAIN

	None, Per Cent	Mild, Per Cent	Moderate, Per Cent.	Severe, Per Cent	Very Severe, Per Cent
60 successful cases	0	60	32	6	2
47 cases unsuccessful	4	49	34	11	2
Because of pain (34)	0	38	44	14	3
Because of hemorrhage (13)	15	77	8	0	0

RADIATION TO BACK AND CHEST		NIGHT PAIN	
Recorded in	Per Cent	Recorded in	Per Cent.
54 successful cases	37	52 successful cases	36
45 cases unsuccessful	20	41 cases unsuccessful	49
Because of pain (32)	25	Because of pain (28)	61
Because of hemorrhage (13)	8	Because of hemorrhage (13)	22

effect of a history of hematemesis is shown in Table V

Vomiting and 6-hour retention were found more than 3 times as frequently in the unsuccessful group (Table VI)

Although the occurrence of pain was about the same in both groups, night pain was much more common in the unsuccessful group (Table VII)

Epigastric tenderness was twice as common in the unsuccessful group (see Table VIII)

TABLE VIII
PHYSICAL EXAMINATION—EPIGASTRIC
TENDERNES

Recorded in:	
49 successful cases	Per Cent 22
41 cases unsuccessful	34
Because of pain (28)	50
Because of hemorrhage (13)	0

Gastric acidity was determined by extraction 45 minutes after an Ewald meal. The degree of acidity on the first study had little prognostic significance, but it was found that in 56 per cent of the successfully treated cases and in 77 per cent of the unsuccessful cases the acid curve after treatment remains the same as it was before. In 36 per cent of the successful and in 5 per cent of the unsuccessful, there was a tendency to reduction of acidity after treatment (see Tables IX and X).

X-ray signs of ulcer were classified as to motor activity and deformity of the duodenal cap, the latter being described as slight, moderate, marked or "no filling." These findings before treatment had little bearing on the prognosis. However, in the successfully

TABLE IX
GASTRIC ACIDITY

	Free HCl 50 to 60 or Over Per Cent	Free HCl Between 40 and 60 Per Cent	Free HCl Under 40 Per Cent
60 successful cases	40	29	31
47 cases unsuccessful	36	49	15
Because of pain (34)	41	41	18
Because of hemorrhage (13)	23	69	8

TABLE X
EFFECT OF TREATMENT ON HCL RESPONSE TO A TEST MEAL

	Persistently High HCl (Over 50), Per Cent	Persistently Normal HCl (30 to 50) Per Cent	Persistently Low HCl (Under 30) Per Cent	Decreasing HCl (High to Normal) Per Cent	Increasing HCl (Normal to High), Per Cent
59 successful cases	24	30	2	36	8
39 cases unsuccessful	38	36	3	15	7
Because of pain (27)	41	37	0	15	7
Because of hemorrhage (12)	33	33	8	17	8

TABLE XI
HYPERPERISTALSIS AND DEFORMITY OF DUODENAL BULB

	Hyper- peristalsis, Per Cent	Degree of Deformity of Cap			
		Slight, Per Cent	Moderate, Per Cent	Marked Per Cent	No Filling Per Cent
60 successful cases	43	17	67	15	2
47 cases unsuccessful	60	21	55	19	4
Because of pain (34)	71	12	59	23	6
Because of hemorrhage (13)	31	46	46	8	0

TABLE XII
RADIOLOGIC CHANGES AFTER TREATMENT

	Improvement, Per Cent	Disappearance, Per Cent	No Change, Per Cent
60 successful cases	20	70	10
43 cases unsuccessful	42	16	42
Because of pain (31)	39	10	51
Because of hemorrhage (12)	50	25	25

TABLE XIII
BARIUM RETENTION

	6-Hour Residue, Per Cent	Relieved in Hospital, Per Cent	Not Relieved In Hospital, Per Cent
60 successful cases	10	5	5
47 cases unsuccessful	32	17	15
Because of pain (34)	41	26	15
Because of hemorrhage (13)	8	8	0

treated group duodenal deformity disappeared in 70 per cent, was improved in 20 per cent, and only 10 per cent. were not changed. In the unsuccessfully treated group, 51 per cent of those who later had pain showed no improvement by x-ray.

Although *gastric retention* by x-ray was 4 times as common in unsuccessful cases, its presence did not preclude satisfactory recovery.

Occult bleeding appeared in the stools more than 4 times as frequently in the unsuccessful as in the successful cases.

Some degree of *alkalosis* occurred in 30 per cent of the unsuccessful cases as compared to 3 per cent. in the other group. Of a large group treated by alkalis, the total incidence was 6 per cent. Hypertension was found in 13 per cent of a large series of ulcers, in 33 per cent in the unsuccessful group, and in only 9 per cent of those successfully treated. Over one-half of the cases of mild or severe alkalosis had elevated blood-pressures. Most of the cases of alkalosis were associated with either hypertension or valvulorenal disease or surgical renal disease.

From these statistics the authors conclude that nearly one-half of medically treated cases of duodenal ulcer had one or more recurrences within a period of 5 years. About one-fifth of these recurrences could be ascribed to carelessness on the part of the patient. About

one-fourth of the remaining recurrences showed gross hemorrhage not associated with pain.

The 2 most important features in prognosis are a history of 2 or more *gross hemorrhages* and a *marked intolerance to alkalis*. Other factors are the failure of the duodenal cap to show improvement after therapy, 6-hour retention of barium after 3 weeks hospitalization, a history of 1 gross hemorrhage, difficulty of neutralization, persistent occult blood in the stools, hypertension, and epigastric tenderness. Age, sex, duration of the disease, severity of pain and degree of duodenal deformity at the first examination have little or no prognostic value. Jordan added, in her discussion, that in an analysis of the surgically treated cases 48 per cent had recurrences during the 5-year period, almost the same percentage of failures as those recorded in the medical group.

TREATMENT.—1 *Mucin*.—Since the report of S. J. Fogelson on the use of gastric mucin in the treatment of peptic ulcer appeared early in 1931 (J. A. M. A. 96: 673 (Feb. 28) 1931), several articles have been published both from the experimental and clinical points of view. In the experimental animal, M. S. Kim and A. C. Ivy (Proc. Soc. Exper. Biol. and Med. 29: 686 (Mar.) 1932) have supplemented their previous report in 1931. In the earlier study these workers found that

1 ounce (30 Gm) of gastric mucin a day prevented the occurrence of duodenal ulcers in biliary fistula dogs in which without mucin, the incidence of ulcer is 40 to 60 per cent

The recent study compared the effect of mucin with alkalis in preventing ulcers in "biliary fistula dogs." Both series of 10 dogs each were fed identical diets; one series of 10 received 15 Gm ($\frac{1}{2}$ ounce) of mucin with each meal (twice daily), while the other series received 1 Gm (15 grains) each of sodium bicarbonate and calcium carbonate with each meal. Gastric analyses were done 4 hours after the ingestion of the meal and either alkali or mucin. The average acidity of the mucin series was free acid 8, total acid 80, while that of the alkali series was free acid 0, total acid 35. The control dogs averaged free acid, 27, total acidity 75. No dogs in either series developed ulcers. The authors noted, however, that the dogs receiving mucin "did much better in regard to appetite, general condition and maintenance of body weight than the dogs on alkaline powders."

A. J. Atkinson (J. A. M. A. 98:1153 (Apr. 2) 1932) reported the clinical use of mucin in 43 patients with peptic ulcer. The usual dose of mucin was 90 Gm (3 ounces) a day. Hospitalized patients were given hourly feedings of milk and cream with a variable number of additional feedings of cereal, soft eggs or custard. Mucin was given hourly between feedings. In these patients hourly extractions of gastric contents were made to determine gastric acidity. Ambulatory patients were given 3 meals with 15 Gm ($\frac{1}{2}$ ounce) of mucin with meals, between meals and in the evenings. The "acid test" of Palmer (Arch. Int. Med. 46:165 (Aug.) 1930) was done at intervals as an "index of the

desensitization of the pain mechanism in patients who had a positive acid test before treatment."

The author noted that the buffering action of mucin *in vivo* varied and was not proportional to the amount fed, contrary to the results of experiments *in vitro*. This effect was attributed to the possible presence of secretagogues in the mucin (see Rivers *et al.*)

During treatment the first change noted was the diminution of night pain and absence of pain during the day when mucin was taken. Check-up x-ray studies revealed less spasm in most cases, in none was there an increase in the ulcer deformity or spasm.

The 43 patients in this series became symptom free in an average period of 17 days. Palmer's alkali group of 27 patients became symptom free in an average of 28 days. The author concludes as follows: "Although any form of therapy may bring about a remission, there is no doubt that remarkable results have been obtained in patients who were previously having distress on dietary or alkali management. The time of observation has been too short to prove that the improvement is permanent in a disease in which the natural history is so variable. The ultimate success of any treatment depends on the frequency of recurrence of ulcers in the same or different locations in ulcer-bearing individuals. However, I feel fully justified in believing that mucin treatment is conducive to healing."

A. B. Rivers, F. R. Vanzant and H. E. Essex (J. A. M. A. 98:1156 (Apr. 2) 1932) noted that patients responded differently to various batches of mucin. They found that the average gastric acidity of patients treated with mucin was higher than those treated with alkali. When mucin was used as a test

meal, it was found that the degree of acidity approximated that obtained after histamine injection. In animals, 10 Gm ($2\frac{1}{2}$ drams) of mucin produced an effect approximating that of 150 mg ($2\frac{1}{2}$ grains) of histamine. Further biologic tests on a dialysate obtained from mucin proved it to be identical in action with histamine. In some samples of mucin approximately 3 mg ($\frac{1}{20}$ grain) of this substance would be recovered from 1 Gm (15 grains) of mucin, indicating that patients receiving 240 Gm (8 ounces) of this mucin obtained 700 mg (11 ounces) of a histamine-like substance.

Thirty seven cases of intractable ulcer were treated with gastric mucin by C. F. G. Brown, S. P. Cromer, E. L. Jenkinson and N. C. Gilbert (*Ibid* 99-98 (July 9) 1932). The authors call at-

were hospitalized and subjected to the following routine, a weekly 2-hour fractional test, followed by 15- to 30-minute aspirations for 2 to 26 hours, aspirations twice weekly at 11 P.M., weekly blood counts, all stools tested for occult blood and x-ray study at 2- to 4-week intervals. Sixteen out-patients were included. These had weekly interviews with an Ewald test meal and stool analysis.

Mucin therapy was begun after strict management had been tried for an average period of $3\frac{1}{2}$ years. There were 31 men and 6 women. The ulcers were classified as follows: 31 duodenal, 2 jejunal, 1 gastric, 1 duodenal and gastric. Fourteen of the ulcers were penetrating, 3 had produced massive hemorrhages, and 5 patients had had previous perforation.

TABLE XIV
RESULTS.

	Mucin Group	Alkali Group
Benzidine test negative in stomach in average of	90 days	240 days
Benzidine test negative in stools in average of	115 days	272 days
Average weight gain	$13\frac{1}{4}$ lbs	90 lbs

tention to the difficulty of establishing criteria of improvement in peptic ulcer patients. Subjective symptoms are unreliable, since ulcers may grow deeper in spite of subjective improvement, or conversely, subjective symptoms may increase in spite of the disappearance of the defect by x-ray. In selecting cases for the present report, the authors based the diagnosis subjectively on an ulcer history with relief of symptoms by mucin, powders, neutralizing food or aspiration; and, objectively, on the presence of blood in the stomach and stools, hyperacidity and an x-ray defect. Twenty-one of the 37 cases reported

The authors conclude as follows:

1. Thirty-six of the 37 patients were relieved objectively and subjectively.
2. The x-ray defects were reported to be more influenced by mucin than by previous therapy.
3. Emptying time diminished on mucin.
4. Gross and occult blood disappeared from the stomach and stools more rapidly than with the usual treatment.
5. Mucin therapy was effective in controlling several massive hemorrhages from the stomach.
6. No recurrences were noted in 36 patients who had frequent previous recurrences.
7. The degree of hyperacidity tested 12 hours after the last dose of mucin or alkali was not materially different in either group.

8 Mucin when placed in the stomach did not have a marked neutralizing effect neither was any secretagogue action noted. The patients showed an increase in the feeling of well-being and in appearance on mucin.

9 Mucin had a beneficial effect on the bowel.

10 One failure was noted in a penetrating ulcer.

11 Mucin was of definite aid in intractable cases.

2 **X-rays.**—Although it has long been known that exposure to x-rays lowers the acidity of gastric juice, little practical application of this fact has been made. E. S. Emery, Jr. (New England J. Med. 206:717 (Apr. 7) 1932) reports the use of x-ray therapy on 18 ulcer patients who presented difficult problems of management. In all cases there was a drop in gastric acidity. Five patients were temporarily completely relieved of pain, while 2 were made worse. One perforation occurred. The author states that the effects are often temporary and that the procedure is probably not warranted on the average patient whose symptoms can be controlled by other measures, because of the possible injury to the pancreas, kidneys and adrenals. In the series presented (6 with jejunal and 2 with duodenal ulcers), the results were considered satisfactory in 4, questionable in 2, and unsatisfactory in 2. In 6 there was an increase in pain for a week or 10 days; the pain then subsided. In 4 there was complete remission for a varying period of 6 weeks to several months. Two patients continued to have pain and in 1 of these perforation occurred. In all cases there was a drop in gastric acidity, a temporary achlorhydria occurring in 4. In 6 the degree of acidity and amount of pain roughly paralleled each other.

3. **Subtotal Gastrectomy.**—Walter Sebening, a German surgeon, defended

gastric resection at The Mayo Clinic (Proc. Staff Meet. Mayo Clin. 7:139 (Mar. 9) 1932). The type of ulcer seen in Germany is different from most ulcers observed in this country, because of the extensive inflammatory lesions surrounding the ulcerated area and also because of the frequency of large or multiple lesions. Many more peptic ulcers demand surgery abroad than here, and there is a relatively high incidence of gastric ulcer as compared with duodenal ulcer. Gastritis is a common finding in association with ulcers in Germany. Konjetzny has reported 40 per cent of ulcer cases as showing macroscopic evidence of gastritis involving the entire antrum.

Partial gastrectomy is recommended by the author because it removes the danger of obstruction, hemorrhage and perforation. The region of common recurrences is removed. Free emptying of gastric contents is resumed. A statistical review of more than 25,000 cases shows occurrence of gastrojejunal ulcers in only 0.7 per cent. Walters (*Ibid.* p. 143) remarked on the fact that at The Mayo Clinic the ratio of gastric to duodenal ulcers is about 1:10, while in German Clinics the ratio varies from 1:4 to 1:1. During the previous 8 months the writer had done gastric resections in selected cases. In only 2 was gastritis demonstrated. Walters suggested that the small group of recurrences following gastroenterostomy (2 per cent) seen at The Mayo Clinic may not be due to the presence of gastritis. However, since gastroenterostomy and pyloroplasty can be carried out with an operative mortality of less than 1 per cent, they would seem to be the operation of choice over a procedure which carries a mortality of from 5 to 10 per cent.

PERITONITIS.—ETIOLOGY.

—In a study of peritonitis, F L Melaney, H D Harvey and H Z Jern (Arch Surg 22 1 (Jan) 1931) state that certain facts have been deduced by their investigations. *Lesions of the appendix* are the cause of peritonitis in the great majority of patients who are admitted to a general hospital. If the peritonitis is limited in extent, very few organisms are found in the peritoneal exudate. If there has been no perforation of the appendix, the disease is usually not fatal, even if the appendix is gangrenous or simply inflamed. Extensive peritonitis is of frequent occurrence if the appendix has perforated. The peritoneal exudate is profuse and large numbers of bacteria of several different species are found. The disease in these cases is often fatal. The course is stormy, and if the patient recovers, the stay in hospital is about twice as long as where there has been no perforation. When the appendix is gangrenous, no evidence was found, from an examination of the peritoneal fluid, that the spore-forming anerobic bacteria, either pathogenic or nonpathogenic, are particularly active. Following perforation, in only 40 per cent, or 12 of 30 cases, was the *C. Welchii* found, whereas *B. coli* was found in every instance. In 9 cases of gangrene of the appendix without perforation, *C. Welchii* was not found once. Of the 6 fatal cases of perforative appendicitis, *C. Welchii* was found in only 2 or 33 per cent.

Perforative lesions of the small intestine early gave severe symptoms. In perforations of the upper intestinal tract, organisms were not usually seen on smear, and early cases yielded no growth. Perforations of the lower small intestinal tract were invariably

fatal. The peritoneal exudate was usually profuse and turbid, many organisms were seen and all yielded bacterial growth. Slow development of symptoms characterized perforative lesions of the large intestine. They occurred in older people, and more bacteria were found both in smear and in culture, including *C. Welchii* which was invariably present. Four out of 5 of the patients recovered. In the authors' series of perforative lesions of the gall-bladder every case was fatal. Bile will cause a peritonitis, even if sterile; microorganisms will appear in the peritoneal exudate.

G Gucci (Policlinico sez chir 39 44 (Jan) 1932) studied experimentally the absorption of *Bacillus coli* by the normal and inflamed peritoneum. He found that colon bacilli injected into the normal peritoneal cavity passed rapidly and directly into the blood stream and lymphatics.

The production of a well-developed plastic peritonitis hindered the passage of the bacteria into the lymphatics and blood stream. Peritonitis of milder grades impeded the entrance of the bacilli into the blood stream, but did not prevent their migration into the lymphatics and thence into the thoracic duct.

In experiments in which the thoracic duct was sectioned prior to the intraperitoneal injection of the bacteria, the blood stream remained sterile.

Two cases of fetal peritonitis in twins, due to the *Bacillus fecalis-alkaligenes* a saprophyte of the intestine, are reported by H Slobosiano (Nourrisson 20 26 (Jan.) 1932). One infant died 36 hours, the other 6 days after birth. Examination at necropsy demonstrated the presence of a fibrinopurulent peritonitis. The cultures of the peritoneal

fluid in both infants were positive for the *Bacillus tetralis-ahalyensis*.

Diffuse peritonitis was rarely found in patients with symptoms of less than 12 hours' duration, but usually in later cases. These cases were more severe than when localized peritonitis was present, the peritoneal fluid was profuse and many organisms were seen on smear and recovered on culture. Moreover, there were frequent complications and one-third of the patients died. With abscesses the disease was of long duration, the symptoms moderately severe. The fluid was thick and contained many organisms. The mortality was one-half that of the diffuse group. The 3 commonest microorganisms found were *B. coli*, *S. viridans* and *C. Welchii*. Of prognostic value were peritoneal fluid smears made at the time of operation and compared with the culture. Every patient recovered where smears showed no organisms and cultures yielded no growth, and when fewer species appeared in culture than were seen on the smear. There was potential danger where more kinds of organisms appeared on culture than were seen on the smear. More than one-fifth of these patients died. More than one-quarter of the patients died when all of the forms seen on the smear were positive on culture.

PATHOLOGY.—The *perforation of tuberculous ulcers of the intestine into the peritoneal cavity* is discussed by P. Wilmoth and J. Baumann (J. de chir. 39: 510 (Apr.) 1932). The classical texts state that perforation of tuberculous ulcers of the intestine into the free peritoneal cavity, with resulting diffuse peritonitis, is rare, because adhesions are usually present between the loops of small intestine and the ulcers perforate into the intestine or rupture into a part of the peritoneal cavity

which is walled off by adhesions and cause the formation of an abscess. However, the authors believe that perforation into the free peritoneal cavity is not so rare as is generally supposed. They have seen 3 cases which they report in detail and review 5 cases from the literature.

In the literature they have found 3 cases of perforation of the large intestine and 15 of perforation of the small intestine into the peritoneal cavity with resulting diffuse peritonitis. In one of their own cases there was a perforation of Meckel's diverticulum. Three of the 18 cases were cured by operative procedures.

One of the authors' patients died about 3 months after operation from tuberculous peritonitis. Another, who was operated upon in November, 1931, was in good condition one year later. The patient with a perforation of Meckel's diverticulum died, 3 weeks after operation, from pulmonary tuberculosis.

The cases which were saved by operation were operated upon within 2 or 3 hours after the diagnosis of acute diffuse peritonitis was made. The authors believe that if suture of a perforated intestinal ulcer is done early, life may often be saved. The chief essential is closure of the perforation. Resection is contraindicated because the patient is not in a sufficiently good condition to withstand it and, the tuberculosis being generally quite extensive, it would be necessary to make the anastomosis in edematous or ulcerated tissue.

As in any acute diffuse peritonitis, it is advisable to drain the cul-de-sac of Douglas. A small fistula developed in the author's case in which this was done, but soon closed.

The late *prognosis* should always be reserved, as the patient may succumb

to progressive tuberculosis of the intestine or some other part of the body

Neurogenic Factors.—F. E. Walton, R. M. Moore, and E. A. Graham (Arch Surg 22 829 (May) 1931) made an experimental study to determine the *nerve pathways* in the *vomiting of peritonitis*, because of the apparent lack of proof that vomiting in peritonitis is really due to irritation of the peritoneum. They conclude that the vomiting from peritoneal inflammation is reflex, rather than toxic, and is the result of stimulation of efferent nerve endings located in the peritoneum. The emetic impulse passes to the medullary center by way of sensory nerve fibers which are included in both the vagal and sympathetic trunks. This type of vomiting is not abolished by sympathectomy alone or by vagotomy alone, so that the efferent emetic impulse evidently traverses either pathway.

J. J. Robb (Brit J Surg 19 634 (Apr) 1932) attempts to explain the clinical manifestations of peritonitis on the basis of a disturbance in the sympathetic innervation. In the majority of cases, the *ileus* associated with peritonitis is not of the mechanical variety. Distention of the gut early in peritonitis involves largely the small bowel. The duodenum and jejunum are distended most markedly, but later the ileum may become involved. Interference with motility is especially apt to occur at the physiological sphincters, *i.e.*, pylorus, duodenojejunal junction, and ileocecal region. Robb believes that at these points there is a hyperactive sphincteric control associated with paralysis and distention of the gut produced by sympathetic stimulation from peritoneal irritation.

VARIETIES.—*Pneumococcus Peritonitis.*—*Etiology*—According to

Nove-Josserand (J de méd de Lyon, 13 99 (Feb 20) 1932), pneumococcus peritonitis is a pneumococcemia and a diffuse infection that can be localized in the lungs, heart, kidneys and other organs, without showing these lesions clinically in the fifth period of the disease. W. Obadalek (Deutsche Ztschr f Chir 233 587, 1931) concludes from his experiments that, in children, the cause of pneumococcic peritonitis is in the bowel contents, and that the peritonitis is produced by the migration of bacteria through the bowel wall. The primary condition is an enteritis, which is responsible for the diarrhea characteristic of the early stages of pneumococcic peritonitis. S. D. Lazarus (Am J Surg 17 70 (July) 1932) states that pneumococcic peritonitis in children is rarely primary but usually complicates infections of the upper respiratory tract. Lazarus states that pneumonia in children is rarely complicated by pneumococcic peritonitis. He points out that the rôle of the kidney in the extension of the organisms from its source to the peritoneum, deserves thorough study as an etiological factor.

Symptomatology and Diagnosis—Nove-Josserand (*loc cit*) states that no symptom is pathognomonic. The diagnosis should be established after a consideration of the symptoms peculiar to pneumococcus peritonitis and their evolution. The early age, female sex, absence of a prodrome, preexistence of a pleuropulmonary infection or, better, an angina, a rhinopharyngitis, an otitis or a vulvovaginitis, with progression to influenza, can lead to a presumptive diagnosis of pneumococcus peritonitis. Other symptoms are a sudden violent onset with rapid elevation of temperature to 40° C (104° F) or higher, fol-

lowed at the end of several hours by an almost complete lull in the pains and vomiting and a fall of the temperature to 38° or 38.5° C (100.4° or 101.3° F). Such sedations in appendicitis are not as marked. Examination of the abdomen reveals a slight distention without contraction of the wall and without distinct pain on pressure. The patient seems to suffer more from colic than from a peritoneal reaction. The right iliac fossa is supple and only slightly painful, it can be palpated deeply without feeling resistance.

B. Paz and I. D. Bobillo (Sem. med. 39:1316 (Apr.) 1932) point out that, contrary to current conception, diarrhea is not a constant symptom, constipation is also frequently observed. The patient with pneumococcic peritonitis presents a grave condition of infection, which is not in relation to the local picture. Frequently, the disease is erroneously diagnosed as peritonitis of appendicular origin. Pneumococcic peritonitis at the onset of the disease is a generalized peritonitis. At a further stage it is localized, while the contrary is true of peritonitis of an appendicular origin.

Mortality—In commenting on mortality in the various types of peritonitis, Lazarus (*loc. cit.*) states that nonpneumococcic peritonitis in the child offers the worst prognosis, 85 per cent.; pneumococcic next, 70 per cent., and acute suppurative peritonitis a good prognosis, 30 per cent. W. Obadalek (Zentralbl. f. chir. 58:1250 (May 16) 1931) reports upon 47 cases of pneumococcic peritonitis, 37 of which were cured, and 10 died in spite of operation. Of 10 patients with localized abdominal empyema, only 1 died. Of 37 patients with diffuse peritonitis, 9 (24 per cent.) died and 28 were discharged cured.

Treatment—Although statistics show that the mortality of pneumococcic peritonitis decreases with the duration of the disease Obadalek could not decide to give up **early operation**. It is almost impossible to foretell whether the peritonitis will become localized or not. Furthermore even in the third stage that of localized abdominal empyema, sudden diffusion of the infection may occur at any time and if it should attack some vital organ, it would then be too late to interfere. The danger of conservatism in pneumococcic peritonitis lies in the fact that early diagnosis is by no means always certain. In several cases the diagnosis was wrong, peritonitis of appendiceal origin or a combination of pneumococcic peritonitis and appendicitis being discovered.

The operation consists of **bilateral incision and drainage**, and, if possible, **removal of the appendix**. It should be performed quickly and should not require more than 20 minutes.

Lazarus (*loc. cit.*) states that early laparotomy with drainage or later, when there is definite localization, appears to offer the best results in all types of peritonitis in children. Patients upon whom a laparotomy was performed at any time lived on an average 4 days longer than the nonoperated cases. Outside of laparotomy and symptomatic medication for stimulation or comfort, nothing stood out as a therapeutic aid to these patients.

Meconium Peritonitis.—A case of meconium peritonitis is presented by W. S. Boikan (Arch. Path. 14:50 (July) 1932) from spontaneous rupture of a Meckel's diverticulum in the first half of intrauterine life. The cause of the rupture was the excessive development of lymphatic tissue in association with deep submucosal crypts of Lieberkuhn.

in the wall of the diverticulum, with secondary focal disappearance of muscularis. Rupture took place with the development of positive intrainestinal pressure from the entrance of meconium. The short segment of ileum and the entire colon distal to the perforation were hypoplastic and devoid of contents, the colon retaining its early fetal proportion to the small intestine. This is attributed to the lack of the distending and growth-stimulating action of the meconium, diverted by the perforation into the peritoneal cavity.

Renal Peritonitis.—Peritonitis of renal origin is cited by W. Birkenfeld (Chirurg 4:333 (Apr 15) 1932). He states that penetration of pus into the peritoneal cavity from the kidney region is rare, as the peritoneum offers considerable resistance to the spread or penetration of pus.

The author reports the case of a 3-year-old girl with suppurative peritonitis and basal empyema on the left side, which were caused by the degeneration of a hypernephroid growth of the left kidney. As the tumor of the kidney had produced no clinical symptoms, only empyema and peritonitis were considered in the diagnosis. Laparotomy revealed intense congestion of all of the bowel loops, with only a very small amount of fibrin deposit and a small quantity of cloudy exudate in the peritoneal cavity. The cause of the peritonitis was found at autopsy, but a perforation could not be demonstrated. Bacteriological examination disclosed the presence of hemolytic streptococci.

The author concludes that in all cases of peritonitis in which the focus of infection is not evident, the kidneys should be examined at operation.

Migratory Peritonitis.—S. A. Wile and O. Saphir (Am J. Dis. f Child

43:610 (Mar) 1932) report that 24 cases of peritonitis, 21 of which were diagnosed clinically as hematogenous peritonitis, proved at necropsy to be the result of an invasion of the peritoneal cavity by bacteria from primarily diseased intraperitoneal organs or structures close to the peritoneum, without perforation or without direct extension of the inflammatory process to the peritoneum. Sixteen of the 24 cases showed enteritis. The term "migratory peritonitis" seems appropriate for this type of case, because it corresponds with the German term, "*Durchwanderungs-peritonitis*" and signifies the pathogenesis of this form of peritonitis. The authors believe that clinical reports of cases of hematogenous peritonitis without necropsies, or with necropsies but without complete histologic examination of the gastrointestinal tract, such as comprise the bulk of the literature of so-called hematogenous peritonitis, should be discarded. Many of the cases in which the condition was reported as hematogenous peritonitis are examples of migratory peritonitis. The evidence supporting the occurrence of peritonitis directly following a blood stream infection without an intermediary lesion within or adjacent to the peritoneal cavity is inadequate. So-called hematogenous peritonitis may occur as part of a generalized metastatic pyemic process that results in abscess formation or infected thrombi within or adjacent to the peritoneal cavity. The ensuing peritonitis is the direct result of the abscess or thrombus. It is unlikely, however, that this form of peritonitis does occur in the absence of other metastatic pyemic phenomena.

Rheumatic Peritonitis.—F. C. Wood and F. L. Elason (Am J Med Sc 181:482 (Apr) 1931) report a

typical case of rheumatic peritonitis. They comment that the literature contains a considerable number of reports of cases of presumable "rheumatic peritonitis." In a certain number of these, the clinical, operative and necropsy findings establish beyond question the presence of a peritoneal lesion. There is no proof that these peritoneal lesions are rheumatic in etiology, but the following observations are pertinent: (1) the close clinical association of the peritonitis and the rheumatic fever suggests a common etiology, (2) the peritoneal lesions do not resemble in appearance nor in clinical course any other known type of peritonitis, (3) in 1 fatal case of acute rheumatic fever a serofibrinous peritonitis was found which resembled, grossly and histologically, coexistent lesions in the pleura and pericardium which were typically rheumatic.

COMPLICATIONS.—J Minne (Echo med du nord 36 38 (Jan 23) 1932) reports the case of a boy, aged 10, admitted to the hospital with the diagnosis of appendicular peritonitis. Immediate operation disclosed subperitoneal edema, a large quantity of intraperitoneal, brown, very fetid pus, gangrenous patches on the parietal peritoneum and the cecum, and the appendix adherent to the gall-bladder, enormous, black, with perforation of its tip and surrounded by a large focus of *gangrene*. After resection of the appendix the cavity was filled with a Mikulicz drain soaked with antigangrenous serum and an energetic postoperative treatment instituted, prognosis being very bad. Two days later a gangrenous portion of the omentum was found and resected and rectovesical space drained. Ten days after operation a fecal fistula appeared at the site of insertion of the appendix; there was a rise in tempera-

ture and an inflamed aspect of the left side of the scrotum from which fecal pus was drained on incision, the boy had a congenital left inguinal hernia with resulting left vaginal pyocele. Slow recovery followed for 1 month, leaving only the fecal fistula to be attended to. The first two attempts at extraperitoneal closure of the fistula were unsuccessful, the second one resulting in reinfection of the surrounding abdominal wall. A third attempt made 4 months after the initial operation succeeded, thanks to a radical intraperitoneal intervention. A large eventration persisting at the site of the original Mikulicz packing was later operated on and the abdominal wall perfectly restored.

Two cases of *subphrenic abscess* are discussed by Deltor del Valle and B Malbran (Arch argent de enferm d ap digest y de la nutricion 6:385, 1931). They state that as the subphrenic space is divided into a number of separate chambers, subphrenic abscesses tend to be multiple. In from 30 to 35 per cent of cases, subphrenic abscess is caused by peritonitis following appendicitis, and in 20 per cent by peritonitis following gastric ulcer. The abscess may be formed by direct propagation, embolism on the convex surface of the liver resulting in a liver abscess which ruptures into the subdiaphragmatic space, intraperitoneal lymphatic propagation, or direct or lymphatic retroperitoneal propagation. The last two mechanisms are found particularly in cases of subphrenic abscess caused by appendicitis.

The 2 cases of subphrenic abscess reported by the authors were those of patients 42 and 41 years of age. In both, the abscess was on the right side and occupied both the anterior and the posterior chambers. In the first case there

was no doubt that the abscess originated from appendicitis. In the second case, the patient had had peritonitis and was operated on for appendicitis, but the findings at operation suggested that the cause of the symptoms was a perforated ulcer. Recovery occurred after 2 weeks. The subphrenic abscess developed on the right side 8 months later. X-ray examination then disclosed a lesion in the first part of the duodenum.

The mortality of operation for subphrenic abscess varies from 23 to 50 per cent. The authors attribute the recovery in their cases to the early drainage. In cases not operated upon the mortality is 75 per cent. In cases of double abscess, such as those reported by the authors, both anterior and posterior drainage must be established. The chief problems in the surgical treatment are to determine which is the principal focus and whether the cavities communicate with each other or can be made to communicate so that one operation will be sufficient. X-rays will show the presence of a subphrenic abscess and the side involved, but will not show whether the abscess is anterior or posterior or both.

In the 2 cases observed by the authors, operation was performed by the transpleural and transdiaphragmatic route. This is a very good route for operation on an anterior collection when exploration is necessary. Ochsner recommends a subperitoneal route through an incision paralleling the costal border and separation of the parietal peritoneum from the diaphragm for exploration of the upper surface of the liver. If this route proves unsatisfactory for drainage after the abscess has been found, the wound may be closed and another incision may be made.

Peritoneal adhesions, according to A. Ochsner and E. Garside (Surg. Gynec. Obst. 54: 338 (Feb.) (No. 2 A) 1932), are protective in the presence of infection. Normally, the diffuse fibrinous adhesions which form in the peritoneal cavity following mechanical, chemical or bacterial trauma, disappear after their usefulness has been served, the fibrin being digested by a proteolytic ferment liberated from polymorphonuclear leukocytes. If the fibrin is not removed, it becomes organized, *i. e.*, replaced by fibrous tissue. Following division of the fibrous adhesions, they may recur. Individuals with an inherent tendency toward the development of fibrous tissue, *i. e.*, "adhesions diathesis" or "keloid tendency," are especially apt to reform adhesions after their division. Numerous substances and methods have been used to prevent the formation and reformation of adhesions, but few have proved to be of any value. In the authors' investigation, the efficacy of digestive ferments in the prevention of the formation and reformation of peritoneal adhesions was determined. Following division of preexisting adhesions, adhesions reformed in 100 per cent of the cases. If, however, physiologic solution of sodium chloride was added to the peritoneal cavity following division of the adhesions, few or no adhesions reformed in 13.32 per cent. If trypsin and papain solutions were added, few or no adhesions formed in 42.28 per cent and 90.89 per cent respectively. It is evident that, experimentally, at least, digestive ferments (especially papain) are of value in preventing the reformation of peritoneal adhesions. Trypsin and papain solutions were used in 14 clinical cases. The period of observation is still too short to draw any conclusions concerning the end-results.

in these cases. In 1 case, however, in which the patient was operated on several times for adhesions ileus, in which trypsin was employed, there has been a recurrence of adhesions. The others have remained free from symptoms for from 6 months to 5 years. From both their experimental and their clinical observations, the authors are convinced that the **intraperitoneal injection of papain solution** in the dilutions recommended (from 1:50,000 to 1:100,000) is entirely without danger.

PROPHYLAXIS.—A rapid method of protecting the peritoneum against peritonitis is outlined by B. Steinberg (Arch. Surg. 24:308 (Feb.) 1932). The author points out that protection against peritonitis can be obtained by the **intraperitoneal injection of colon bacilli** (culture 300). Protection secured with heat-killed colon bacilli is greater than that obtained with a mixture of the virulent organisms usually found in appendicitis and peritonitis. The protection secured is not a true immunity process, but a hyperleukocytosis and phagocytosis, due to a coincident presence of polymorphonuclears at the site of infection. The term *hyperleukocytic preimmunity* is suggested for this process. On the basis of experiments on animals, a method is introduced that is applicable in the prevention of peritonitis in man following surgical intervention in the intestinal tract. The protection can be achieved in 4 days, following the performance of the operation on the fourth or the fifth day after the first immunizing dose.

The presence of a transudate favored rapid absorption of the colon bacilli into the blood and lymph streams.

The author concludes that in generalized infective peritonitis the bacteria are not absorbed by the blood or lymph ves-

sels of the inflamed peritoneum and that the absorption of the peritoneum is inversely proportional to the grade of the inflammatory process.

TREATMENT.—The treatment of peritonitis, according to J. J. Robb (Brit. J. Surg. 19:634 (Apr.) 1932), should be directed toward (1) treatment of the peritoneum itself; (2) treatment of the hyperactive sympathetic system, and (3) replenishment of the body's chlorides and fluids. As regards the peritonitis itself, the **avoidance of unnecessary trauma** is especially important. To combat the hyperactivity of the sympathetic system, **simple drainage** is indicated. The administration of $\frac{1}{100}$ grain (0.01 Gm.) of **morphine** every 4 hours after the operation is recommended. **Gastric lavage** is imperative to maintain the patient's strength. The early administration of fluid by mouth or rectum is condemned because it aggravates the vomiting. Moreover, attempts to replace fluids early are futile, because fluids are lost by perspiration and vomiting.

It is often difficult to determine just how long to continue with conservative therapy. However, the appearance of pus in a wound or in the drainage usually indicates improvement. When this is noted, replenishment of fluids may be attempted. In the cases of patients who are *in extremis*, a sign of improvement is the objective sensation of warmth. To combat the hyperirritability of the sympathetic system, the opium is stopped and $\frac{1}{100}$ grain (0.00065 Gm.) of **atropine** is administered every 4 hours. Following gastric lavage, peristalsis is stimulated by the administration of raw meat juice. From 1 to 2 pints (500 to 1000 cc.) of normal saline solution and 4 per cent gum acacia are given

intravenously. When improvement begins the first enema is given. Atropine has no action on the normal tonus of sphincters, but abolishes sphincteric hypertonus. Pituitrin should never be used as it increases sphincteric hypertonus.

The treatment described has been used in 30 cases of general peritonitis, including a case of pneumococcal peritonitis and 2 cases of puerperal peritonitis. There was 1 death from bronchopneumonia.

E. C. Baumgarten (J. Michigan M. Soc. 31: 257 (Apr.) 1932) states that patients with *generalized peritonitis of appendiceal origin* should be treated as cases of intestinal obstruction. Intestinal drainage is paramount in the treatment of these patients. Primary ileostomy is a satisfactory means of securing intestinal drainage, controlling dehydration and the acid-alkali balance of the blood plasma. Persistent fecal fistula is not a common complication. Nineteen cases of generalized peritonitis following appendicitis are reported by the author with 3 deaths, or a mortality rate of 15.7 per cent.

PERLÈCHE.—Perlèche is a disease found more frequently in infants and children than in adults. It affects the skin and mucous membrane of the commissures of the lips, producing an inflammatory reaction, with maceration, thickening and desquamation of the epidermis. Sometimes fissures form which are painful and tend to bleed easily. The disease runs a course of a few weeks or longer, but has a great tendency to relapse and may become chronic, especially in adults. Among children it appears to be contagious and epidemics occasionally develop in institutions. While no specific organism has been determined

as the etiological agent, numerous organisms have been accused.

M. H. Goodman (Bull. Johns Hopkins Hosp. 51: 263 (Nov.) 1932) has pointed out that yeast-like fungi of the *monilia* group and closely related types are found as saprophytes on normal skin. Regarding the superficial yeast infection, as with fungus infections in general, much confusion still exists concerning the specificity of the various types of organisms in producing any particular local disease of the skin. However, at times, yeast-like organisms are found in sufficient abundance in certain inflammatory conditions to indicate that they can either provoke or maintain in an active state the diseases which may have as their primary cause a peculiar vulnerability of the intertriginous areas because of the presence of moisture, heat or certain bacterial agents.

An epidemic of perlèche occurring in a Chicago Orphanage, in which 100 cases developed, was described by Finnerud in 1929. In 77 per cent of these cases fungi of the *monilia* or *cryptococcus* type were isolated. Finnerud at that time reproduced the affection from the yeast-like organisms. Later, Skolnik studied 5 cases of chronic bilateral perlèche in adults from which *cryptococci* were isolated in all the cases.

Goodman reports 2 cases, the first that of a Jewess, aged 56, complaining of an itching sensation in the third interspace of the right hand, and soreness in the angles of the mouth when it was widely open. The disorder in the web of the finger had been present for more than 10 years, but never bothered the patient. The sore at the angle of the mouth had also existed for 10 years. The third web of the right hand was the typical picture of *erosio interdigitalis blastomycetica*, the central dull red

area of erosion with the encircling colarette of uplifted, but clinging, thick, whitish soggy scale. A slight exaggeration of the normal fold at both angles of the mouth, produced by a drooping of the upper lip was noted. On the left commissure, directly over the vermillion, there was a pearly, bead-like, soft, whitish, match-head-size papule. This bridged a fissure extending outward from it for a short distance into the adjacent skin and inward into the mucous membrane of the lip. Above and below, the papule was flanked by a fissure, each of which was covered with a thin crust. The skin and mucous membrane adjacent to the fissures were slightly thickened, reddish and scaly. On the right commissure a similar lesion was found, however, not quite so advanced or as active.

The patient further exhibited a disease of the nail of the third finger of the right hand. The outer portion of the nail-plate showed longitudinal grooves and ridges with marked thickening, opacity and blackish-grey discoloration. Inoculations of scrapings from this nail in Sabouraud's maltose agar showed a profuse growth of an organism which microscopically appeared as short, rod-like, slightly branching mycelia with numerous spores. The exact identity was not established.

Histological study of a biopsy from the corner of the mouth showed the following features. The blood-vessels of the subpapillary layer of the corium and even a number of those in the deepest portion of the cutis were dilated, and in most instances were filled with erythrocytes. The endothelial cells of the intimal linings were clearly defined and the nuclei stained intensely. The connective tissue throughout the zone of reaction, which extended from the basal

layer of the epidermis down to the subcutaneous tissue, was very edematous, stained a faint, pinkish color, was considerably disorganized, and scattered into short or long, narrow, loose, wavy bands dividing or surrounding the masses of intense inflammatory cell infiltrate. The lymph spaces were quite distended with the profuse infiltration, which, however, was more dense in the area extending downward from the base of the papillary zone than it was in the papillary bodies themselves. The infiltrate was mostly of plasma cells, but numerous small lymphocytes were found, especially beneath the rete pegs. Isolated, short strands of clearly staining fibroblasts were noted, running perpendicular to the basal layer of the epidermis, but only an occasional fibroblast was found within the plasma-cell infiltrate.

An interesting feature in the section from the lesion on the right side of the lip was the presence of lymphocytes as the predominant cell type, and the dispersion of numerous large mononuclear wandering cells throughout the infiltrate. Many of these macrophages were filled with well-preserved red-blood cells and their nuclei were quite distinct and intact. Trauma could not have been responsible for this extravasation of red blood cells. Only an occasional isolated polymorphonuclear leukocyte was found.

The elastic tissue had been displaced completely by the infiltrate in the papillary and reticular layers of the corium. In the subreticular layer, the elastic tissue appeared intact.

A marked acanthosis of a very irregular kind, was frequent, with many rete pegs extending as far down as the lower third of the cutis and infrequently being extremely broadened, with the formation of sprout-like prolongations

which joined across to form a network enclosing islands of connective tissue. The basal layer was for the most part intact. Frequently at the tip of a rete peg, and in numerous instances at the tips of the papillary bodies, there was a disruption of this layer with the dissolution of a number of cells and replacement by fluid and degenerated cell fragments or lymphocytes. The disruption and dissolution involved to a small or moderate degree the lowermost prickle cells adjacent to the basal cells, with the result that some pyknosis and karyorrhexis of the epidermal cells was noted. In the mid-portion of the prickle layer, and even in the outermost region here and there, were found cell vacuolization with loss of cytoplasm.

Goodman described a second case of perlèche of an acute type, occurring in a girl, aged 9, coming with the chief complaint of a sore on the lips and sores on the arms. The lesions were present about 2 weeks before examination. They involved the right commissure and a lesion was located on the anterior surface of each elbow. On the lips, the lesion was fairly well-defined, circular, yellowish, heaped-up crust about the size of a dime when the lips were separated. The lesion covered an area extending from the vermillion outward over the cutaneous surface for $\frac{1}{2}$ cm. Under the crust the skin and mucosa were somewhat eroded and of a deep reddish color. On culture, a *beta streptococcus (hemolyticus)* was obtained and in subcultures appeared in pure form. Not any of the inoculated tubes showed a yeast-like organism.

PETROUSITIS OR APICITIS.

—Many references have appeared in the American and European literature bearing on this subject. S. J. Kopetzky

(Arch Otolaryn 16 132 (July) 1932) has extensively gone into the anatomy and pathology of the condition. The problems presented by suppuration of the petrous pyramid are rather simple when basic principles are considered. It is not something new—not a new conception—but is a reassembling of data which have found their way into the literature. It may be recognized, handled and cured, or it may produce chronic otorrhea, or more to be deplored, result in meningitis and death. In the literature these cases have appeared as special reports. There will be less and less of the atypical to discuss when fundamental pathology is comprehended. In those studies of cases coming to autopsy with Gradenigo's syndrome, it was found there were meningitides.

A condition which could be recognized long before Gradenigo's syndrome appeared was overlooked. First must be discarded Gradenigo's syndrome as connected with the petrous pyramid. There may be Gradenigo's syndrome without petrosal suppuration, and petrosal suppuration without Gradenigo's syndrome. Osteomyelitis of the pyramid, osteitis of the petrous pyramid, etc., have been confused and added to the misunderstanding. It is necessary to separate the pathologic entities. Wittmaack's theory of pneumatization of the temporal bone must be accepted. The investigator must go back to Wittmaack to find an explanation for what happens. The temporal bone was intended to be pneumatized, but this is not always the case.

When there is no pneumatization, there can be no mastoiditis, and when there is mastoiditis, there must be pneumatization. The process of pneumatization takes place not only in the mastoid

process, but also in the petrous pyramid. The osteitis reaches the meninges by lymph channels and vessels. The advance is slow. Only occasionally is it acute, and then it becomes the more acute as the endocranial structures are reached. The difference between osteomyelitis and empyema must be recognized because different treatment is indicated.

When osteomyelitis goes through the Haversian canal system, there are apt to be subperiosteal and extradural collections of pus. When the lesions reach the endocranium, the process goes up to the tentorium and meningitis occurs. In osteomyelitis of the petrous pyramid sequestrums form, but often in empyema of the coalesced tip there are no sequestrums. The advance in the coalesced tip follows the same route as in coalescence of acute mastoiditis. Theoretically, there may be a coalescence of a pneumatized tip without mastoiditis.

One group of cases of acute mastoiditis fails to be aided by operation on the mastoid, and these have been called *Hittmaack's acute mastoiditis*. No operation on the mastoid is adequate to eliminate infection when the tip of the pyramid is involved and the ear continues to discharge. Chronicity does occur in those mastoids with pneumatization. Chronic cases that have subsided, if studied from the tip angle, will show coalescence. The other result of suppurative lesions in the petrosa is *meningitis*. These cases run their course, and, suddenly, "fulminating" meningitis occurs, so-called in comparison with meningitis following osteomyelitis. Iodized poppy seed oil 40 per cent, injected in these cases went into the middle fossa and spread immediately backward and was held by the tentorium.

According to J. V. Cassady (Arch. Otolaryng 16 176 (Aug.) 1932), laby-

rinthitis—the syndrome of involvement of the petrous tip, increased symptoms of intracranial pressure and fractures through infected ears are precursors of meningitis. Intact bone is not as good a barrier to infection as the dura and meninges. The meninges do not tolerate mercurochrome. Pain in the face, eyes and teeth, together with sepsis and Gradenigo's syndrome, indicates suppuration of the petrous tip. At operations on abscesses of the brain, the dura should be exposed and opened without attacking the abscess until adhesions have walled off the exposed normal brain and meninges. A subsiding purulent, otitic meningitis without organisms should call for careful operative intervention, because the intracranial extension has localized itself and may easily get beyond control again.

When there are intracranial symptoms at operation, it is more important to expose the dura than the sinus. Compound fractures through infected middle ears and the mastoid should be considered potential meningitis. Treatment of the ear canals with mercurochrome or irrigations is contraindicated in compound fractures with lacerations of the canal. The otologist should be alert to all premeningitis signs and symptoms and should have a knowledge of the methods of intracranial extension from the middle ear and a wide clinical and necropsy experience to be able to prevent fulminating cerebrospinal otitic meningitis.

The *symptomatology* of suppurations of the petrous tip is divided by S. J. Kopetzky (Laryngoscope 41:398 (June) 1931) into 4 periods—the period of ocular pain and aural discharge, the period of low grade sepsis, the period of quiescence, and the terminal stage. The *ocular pain* is, in the majority of

instances, the first symptom to make its appearance, and its location and character are almost diagnostic of suppuration of the petrosal tip. The pain is on the side of the lesion, is limited to the region about the eye, and is felt within the orbit itself. It is described as a deep-seated ocular pain and, at the onset, is nocturnal. It is the result of an irritation of the ophthalmic branch of the trigeminal nerve. Of the author's cases, 8 presented this typical pain in the eye as the initial symptom. In 1 patient the pain was present from the onset, while in the remaining 7 a varying interval of time elapsed between the simple mastoid operation and beginning of pain.

If eradication of the purulent focus in the mastoid process and middle ear does not result in a cessation of the pain distributed over the areas supplied by the second and third branches of the fifth nerve, the persistence of the pain, when continuous and not spasmodic, should be considered as indicating the possibility of suppuration of the petrosal tip. In the author's series of cases, either the middle ear continued to discharge until the lesion in the petrous tip was identified and eradicated, or after being dry for a time, a profuse discharge suddenly recurred at the same time as, or shortly before, the onset of the eye pain. Neither the otoscopic picture nor the pathologic findings at operation agreed with that presented by cases of bone caries or secondary cholesteatoma. Operation revealed an unusually large amount of granulation tissue in the antrum or middle ear. Other signs that may appear during this period but that are not diagnostic are *transient facial weakness, vertigo, nystagmus* and *vomiting*.

Postoperative temperature following a mastoid operation may result from

various factors, consequently, no significance can be attached to it unless other symptoms are also present to help determine the source of the fever. The presence of a low grade postoperative sepsis, accompanied by ocular pain and aural discharge, is to be viewed as strong evidence of a suppuration of the petrosal tip. In the majority of cases in this series there occurred an interval of freedom from all pain of any diagnostic value. This period of quiescence varied in duration from 5 to 19 days. Its presence may lead both the patient and the surgeon to conclude that the lesion is clearing up, but in the majority of the author's cases, it coincided with the invasion of the endocranium. In only 1 instance did it signify spontaneous evacuation of the suppuration in the tip through the middle ear.

It is pointed out that the *ocular pain* is due to traction exerted on the ophthalmic branch of the fifth nerve because of the inflammatory swelling of the dura in the region of the petrous tip. Consequently the relief of this inflammation will result in a cessation of the pain. As the lesion progresses and if sufficient drainage is not established through the peritubal cells or through the tract of invasion, the upper surface of the apex becomes eroded, either directly under the Gasserian ganglion or through the thin bony wall which separates it from the carotid artery. Once a perforation has been formed, the pus makes its way subdurally to form an extradural abscess, which, in time, again causes increased tension on the ophthalmic nerve with a recurrence of pain in the eye. The infection spreads through the subarachnoid space, resulting in a purulent meningitis. The terminal period presents the clinical picture of acute purulent leptomeningitis. If the patient's

life is to be saved and meningitis averted, operative measures for draining the petrous tip must be instituted prior to the stage of quiescence

There is only one *treatment, i e, operative*. While suggestions have suddenly cropped out everywhere almost at the same time, surgical treatment has been agreed on. A diagnosis must be made first, then it must be known what to do. In dealing with suppurations of the tip, the literature teems with suggestions. A few authors have reported cures. The technic is simple, but sounds difficult. A simple mastoidectomy has usually been done before the lesion develops. This is converted into a radical operation, the zygoma is then rimmed off almost to the glenoid articulation to get as far forward toward the Eustachian orifice as possible. There is no fear of facial palsy since Ducloux's work has become known. Remove the tubotympanic cells completely and remove the tensor tympani, bore into that area and open it. When the patient is lying on the table, a probe in the external auditory canal gives the general direction. Open the Eustachian tube, entering at an angle of 30°. In conclusion, Kopetzky states that if the Gradenigo's syndrome is taken as a cross country hunter takes a fence—take it in passing and pass on—and the lesion dealt with is diagnosed and specific surgical measures applied to the specific lesion, then the procedure will be faultless and the results will be gratifying. The taking of key plates is important.

In a very extensive study of 367 cases of *suppurative meningitis* of otitic and nasal origin in relation to blood stream invasion of the pial vessels, W. P. Eagleton (Arch. Otolaryng. 15: 885 (June) 1932) summarizes the information gleaned from the 213 operated pa-

tients (145 of whom died and 68, or 32 per cent recovered) and 105 autopsies. Certainly his deductions as to what should have been done are invaluable. He reached the following conclusions:

- 1 There are 2 types of suppurative meningitis, depending on the mode of invasion of the infection and the method of its extension within the arachnoid, *i e*, (a) subarachnoid space meningitis originating directly from a primary focus in the ear or nose, and (b) meningitis secondary to infection of the pial vessels.

- 2 Subarachnoid space meningitis is curable surgically as long as the infection is limited to a basal cistern.

- 3 Meningitis due to infection of a pial vessel is uniformly fatal, at least when it has advanced beyond the neighborhood of the primary focus.

- 4 Pneumococcic Type III meningitis secondary to the infection of pial vessels is generally of sphenoidal origin in the writer's experience. In the acute cases, the route of the infection into the meninx is by blood-vessels, the primary vascular lesion being microscopic, in the more protracted cases, the sphenoidal basis is the seat of a hematogenous infection.

- 5 Consequently, the future surgical treatment of pneumococcic Type III meningitis, to be successful, must be an early attack on the sphenoid. The character of the operation will depend on whether the invading organism enters (a) from a thrombophlebitis of the submucosa or (b) from an osteomyelitis of the sphenoidal base.

- 6 The theory is offered that pneumococci that develop in the vessels of the pneumatizing sphenoid have a selective affinity for the vessels of the pneumatized temporal bone, in which case a positive blood culture appears coincidentally with the meningitis. Embryonal and mechanical facts in pneumatization suggest an explanation for the "elective localization" that certain strains of pneumococci which have developed in the sphenoid have for the temporal bone.

- 7 "Showers of bacteria" from the sphenoid sinus are the cause of a specific type of "embolic pneumococcic otitis," the secondary mastoiditis completely masking the primary inflammation in the sphenoid.

8. Embolic otitis is characterized by spontaneous rupture of the drum membrane without pain. A shower of bacteria from a thrombophlebitis of the sphenoid deposited in the veins adjacent to the petrous bone apparently is the cause of pneumococcic Type III (*Streptococcus mucosus-capsulatus*) meningitis in a large proportion of cases

9. A spontaneous rupture of the drum membrane with little or no pain is suggestive of a blood stream infection

10. *Streptococcus hemolyticus*, which originates in blood-producing spaces of the sphenoidal basis or the petrous apex, also causes a meningitis of the pial vessel type. It likewise is associated with an immediate positive blood culture

11. *Streptococcus hemolyticus* possibly may cause embolic otitis, but, in the writer's experience, the meningitis from this organism is always the result of a localized collection of pus either in the mastoid, in a venous sinus, in an adjacent air space, or in the medullary substance of the sphenoidal basis or of the petrous apex. Consequently, from a surgical standpoint, when meningitis from *Streptococcus hemolyticus* is associated with an immediately positive blood culture (and there is no sinus thrombosis and the mastoid has been well exenterated) an attempt to locate the primary purulent focus in the medullary substance of the petrous apex or the sphenoidal basis should be made

12. Encephalitis, as an early and frequent complication of meningitis secondary to infection of a pial vessel, has been observed. Its cause is explained anatomically. The involvement of the ventricular venous drainage system is associated with edema of the brain and a nonobstructive internal hydrocephalus, which gives rise to a peculiar type of cerebral compression

In discussing *intracranial complications* of otitic origin, I Friesner and J G Druss (Arch Otolaryng 15 356 (Mar) 1932) call attention to the frequency with which disease extending from the middle ear and mastoid becomes localized about the postero-superior portion of the pyramid. A bone focus at this site may develop a brain abscess in either the posterior or

the middle fossa or a meningitis may result. The otologic surgeon must be equipped as a cranial surgeon as well. The authors believe that, with a technic such as Eagleton has described, these foci may be exposed. Furthermore, the question is again raised whether exploration of the brain might not be attended with better results if it were made through such an exposure

PHLEBARTERIECTASIS.— DIAGNOSIS.—

As the result of extensive clinical studies made on a case of hemangiectatic hypertrophy and congenital phlebarteriectasis, H L Blumgart and A C Ernstene (Arch Int Med 49 599 (Apr) 1932) present criteria for the diagnosis of this rare condition. The patient was a school girl, aged 15 years, whose left arm was considerably larger than the right. "Beginning a short distance above the left elbow and increasing gradually down the arm, dusky cyanosis was evident. The finger-nails and finger-tips of all the fingers of the left hand showed a more reddish cyanosis. The fingers of the left hand were longer and more slender than those of the right hand. Several small, red, irregular, cutaneous angiomas, varying from 0.5 to 2.5 cm in diameter, were present over the left forearm and lower third of the left arm, particularly on the extensor surface. The color of these angiomas varied considerably in intensity on different occasions. The left brachial, radial and ulnar arteries were dilated and forcibly pulsating. Pulsating of the anterior interosseous artery was easily felt in the lower part of the left forearm. The veins of the left forearm, and particularly those of the hand, were abnormally dilated and prominent. The engorgement of what virtually amounted

to a venous plexus over the fingers, hand and lower part of the forearm became conspicuous when the hand was placed in a dependent position. With the left arm 65 cm below the level of the right auricle, systolic pulsations were visible in the veins over the back of the left hand.

The blood flow through the left upper extremity was found to be considerably increased, but the volume output of blood per minute from the heart and the velocity of blood flow through the lungs were normal. The velocity of blood flow in the left arm was far greater than that in the right arm.

The authors call attention to the fact that the so-called diagnostic signs of arteriovenous aneurism are not diagnostic of arteriovenous aneurism, but are rather to be regarded as signs of free arteriovenous communication, and that the exact nature and site of the communication must be determined by further study. The following signs may be regarded as manifestations of free artery to vein communication, although they do not denote whether the communication is by direct anastomosis or by intermediate vascular plexes: (a) increase in pulse pressure in the affected part, due to elevation in the systolic and reduction in the diastolic blood-pressure, (b) lowering of the general diastolic arterial pressure of the body, (c) increase in venous pressure in the affected veins and their tributaries without the general venous pressure of the body necessarily being affected, (d) capillary pulsation, (e) raised ventricular rate, (f) normal or increased output of blood from the heart, (g) normal or increased size of the heart, (h) abnormally high oxygen content of the venous blood of the affected part, (i) elevation in the temperature of the skin of the

region in which the abnormal communication is situated, and (j) thrills and murmurs over the site of the abnormal communication and over the arteries leading to the lesion. If after an artery is occluded the ventricular rate slows, the general diastolic blood-pressure of the body rises, a lessening of venous engorgement of the affected part occurs, and the peripheral murmurs and thrills disappear, the abnormal artery to vein leakage lies in the segment of artery compressed or in its peripheral continuation.

The signs of multiple free communications characteristic of hemangiectatic hypertrophy and congenital phlebarteriectasis that distinguish it from the direct anastomosis of arteriovenous aneurism are as follows: (1) there are usually several or numerous dilated arteries leading to the site of phlebarteriectasis, whereas, there is generally but one dilated arterial trunk leading to an arteriovenous aneurism; (2) systolic venous pulsations are transmitted away from the periphery in congenital phlebarteriectasis, whereas they are transmitted toward the periphery as well as centrally in arteriovenous aneurism; (3) increased growth of the region in which the abnormal communications are situated favors the diagnosis of phlebarteriectasis rather than arteriovenous aneurism.

PITUITARY GLAND.—HYPERPITUITARISM.—A case of preadolescent gigantism of pituitary origin in a youth, aged 13, is recorded by L. H. Behrens and D. P. Barr (*Endocrinology* 16:120 (Mar-Apr) 1932). An extraordinary feature was the beginning of abnormal development in early infancy. Growth has been steady without spurts during the entire

period of childhood and has continued at an undiminished rate during 19 months of observation. Of special interest is the low basal metabolic rate, accompanied by subnormal temperature and cold hands and feet. Remarkable, also, is the extraordinary size of the mastoid cells and the pneumatization of the squamous portion of the temporal bone.

HYPOPITUITARISM. — *Symptoms* — In a recent presentation R. M. Calder (Bull Johns Hopkins Hosp 50: 87 (Feb) 1932) reviews 70 cases of insufficiency of the pituitary gland (Simmonds' disease) recorded in the literature.

Perhaps the most striking and characteristic symptom of this disease is the emaciation that sooner or later develops in these cases. In addition there occur changes in the integument, including falling of the teeth and hair, particularly in the axillary and pubic regions, trophic changes in the nails, and thickening and loss of luster of the skin, so marked at times as to resemble scleroderma. These changes combine to give to the patient the appearance of "premature senility." The patients are listless and apathetic, many of them display peculiar forms of pathologic sleep, and in a not inconsiderable number coma precedes death. General muscular weakness is accompanied by corresponding atony of the gastrointestinal tract, with marked constipation, vomiting and a consequent distaste for food. Many of the case reports mention subnormal temperature and feelings of chilliness. In all cases in which it is reported, the basal metabolic rate has been considerably lower than normal, and the blood-pressure is invariably low. The general slowing of all bodily processes, including general muscular debility, gastrointestinal atony, vasomotor weakness,

and decrease in the basal metabolic rate, present a striking similarity to the phenomenon of hibernation, which long has been considered to be under the control of the pituitary body. Without exception, there occur changes in the sexual functions. In the female, menstruation ceases and, as a consequence, sterility ensues. In the male, there is sexual weakness amounting to complete impotence. In both sexes there is absence of sexual desire. In a few cases psychic changes have been described, which range from mild alterations of personality to gross delusion and even delirious states.

Juvenile Type. — *Treatment* — W. Engelbach (Endocrinology 16: 1 (Jan-Feb) 1932) reports 2 cases of hypopituitarism showing marked deficiency of both the growth and sex hormones. The subject of infantile hypopituitarism was 4 years of age, and the other was a juvenile, aged 9½ years. This patient was given replacement treatment of Evans' purified growth hormone. Although Evans discovered the growth hormone in 1922, owing to the difficulties in its purification and separation from the pituitary sex hormone, this is the first human being to whom it has been given. The author contends that hypopituitarism during infancy and juvenility is a very common endocrine disorder. The second subject had an arrested physical development for a number of years previous to institution of endocrine treatment. The growth hormone was given first in very minute doses and gradually increased until 10 c.c. were given intramuscularly. During the 9 months that it was administered, there was an increase of 27 inches in height, 75 pounds in weight, 06 inches in circumference of the head, 17 inches in the chest, and 13 inches in the

abdomen The reaction to treatment during this age is very favorable

TUMORS.—A case of tumor of the pituitary body is reported by A. Rochon-Duvigneaud, P. Veil and Chafir (*Ann d'ocul* 168 931 (Nov) 1931) in a young man, 22 years of age. Rapid loss of visual acuity and contraction of the temporal field had occurred within 8 months. The patient presented an adipsogenital syndrome. The x-rays revealed a large sella turcica. Although 20 applications of x-ray had failed to restore vision, surgical excision of the tumor was followed in less than 3 months by improvement of temporal fields and return of vision to 10/10 O.D. and 3/10 O.S. On pathologic examination the tumor was found to be an *adenoma*.

Treatment.—Since 1925, Charles H. Frazier (*Surg Gynec Obst* 55 330 (Sept) 1932) has been using the transfrontal approach for resection of pituitary adenomata, modifying the technic from time to time, and he claims that the risk of operation has been greatly lessened by this method of approach. In his series of 36 consecutive cases, only 1 death has been reported.

The operation is described as follows.

1 *Anesthesia*—Local anesthesia is used in preference to avertin, as the operation can be conducted painlessly, except when separating the capsule of the tumor from the anterior wall of the sella turcica. At this time an injection of 2 per cent novocaine solution is resorted to, to lessen the pain. The degree of optic atrophy determines whether the approach should be from the right or left. When marked asymmetry exists, the author approaches from the side on which vision is more acute, but he gives preference to the approach from the right.

2 *Incision*—The incision begins 2 cm below the hair line, midfrontal, and gradually curves around to terminate above the ear.

3 The author has adopted the use of the "dual" flap technic, making 2 flaps, one the scalp, the other the bone, the scalp flap is reflected forward and the bone flap, with temporal muscle attached, temporalward. The fact is stressed that in fashioning the bone flap, the anterior limb should be as near the base of the skull as possible. The first perforation is made with a conical trephine, a button of bone removed to be replaced after operation. He makes usually 4 more perforations. The superior margin of the flap is parallel with, and 3 cm from the midline, the base corresponding to a line which is projected from the external canthus of the eye.

4 *Dura*—The approach to the sella is intradural. Sutures are introduced in the anterior margin of the dural incision for traction purposes, and the dura is protected with a cotton square.

5 *Approach*—Frazier points out the importance of approaching the sella by following the greater wing of the sphenoid bone. Sometimes, of course, it is necessary to enlarge the cranial opening with rongeur forceps downward and forward.

6 *Elevation of Frontal Lobe*—The room is now darkened and the operative field illuminated with the author's special brain retractor. Pressure should be avoided at this point on the frontal lobe and especially the region of the tuber cinereum. He suggests also the tapping of the anterior horn of the ventricle before attempting to elevate the frontal lobe, in order to guard against an increase in intracranial pressure or a ventricular block. As the cerebrospinal fluid wells up, it is evacuated from the basal cistern by means of a suction cannula. He notes that an excessive amount of cerebrospinal fluid is always present with pituitary adenomata.

7 *Intrasellar Maneuvers*—The optic nerve is seen and it soon will be apparent whether the surgeon is dealing with an operable or inoperable lesion. The capsule of the adenoma presents between the optic nerves and in front of the chiasm. The length, direction and conformation of the nerves will depend upon the size of the tumor, the larger the tumor, the longer the extent of nerve from optic foramen to chiasm.

8. *Aspiration*—A bluish discoloration of the capsule usually signifies a cyst. Routinely, fluid is aspirated if present.

9 *Capsular Incision*—With a sharp-pointed bistoury an incision is made in the capsule and the glandular contents removed, fragment by fragment

10 *Liberation of Capsule*—Capsule is separated (at this time only will the patient complain of pain) Great care must be taken at this point not to cause any damage to the optic nerves or chiasm.

11 *Capsular Resection*—The floor of the capsule is left intact Again, undue pressure or traction upon the optic nerves and chiasm must be avoided at this stage of the operation Hemorrhage from the margin of the capsular incision is controlled with silver clips

12 *Hemostasis*—Perfect hemostasis is desirable and if any oozing occurs from the remnant of the capsule or floor of the sella, pledgets of cotton saturated with adrenalin, 1:1000, may be used or a tiny muscle graft resorted to Now that the intracranial procedures are finished, ether anesthesia may be given to lessen the tension and strain. The wound is then closed, first the dural incision with interrupted silk sutures, then the wound in the temporal muscle and aponeurosis, and finally the scalp The author suggests the use of a paraffin tape beneath the suture line in closing the dural incision, as a means of protecting the cortex After the bone flap is replaced, the button of bone is inserted in the perforation from which it was removed A counter opening is made for a rubber tube inserted between the scalp and cranium, as Frazier approves of draining this space for 24 hours

In conclusion, the author stresses the fact that the surgeon is usually confronted with a striking uniformity in cases of pituitary adenomata, the location of the tumor never varies, its relation to the adjacent anatomical structures is always the same, therefore, the technic for this operation may be standardized and the operation described above applied to every case without variation

Basophil Adenomas (Basophilism).—H. Cushing (Bull Johns Hopkins Hosp 50:137 (Mar) 1932) sums up the following facts regarding the subject of adenomas of the pituitary body

(1) primary anterior pituitary disorders are commonly produced by adenomas, (2) adenomas of the endocrine series are, as a whole, functionally active lesions, (3) even minute adenomatous tumors of the parathyroids and pancreatic islets may lead to serious constitutional derangements of hypersecretory type, (4) pituitary adenomas are of 3 principal varieties—neutrophil, acidophil and basophil, no constitutional disorder heretofore having been definitely ascribed to the last, (5) there is experimental evidence to suggest that the basophilic elements of the anterior pituitary secrete the sex-maturing hormone, (6) a polyglandular syndrome heretofore supposed to be of corticosuprarenal origin, characterized in its full blown state by acute plethoric adiposity, by genital dystrophy, by osteoporosis, by vascular hypertension, etc, has been found at necropsy in 6 out of 8 instances to be associated with a pituitary adenoma which in the 3 most carefully studied cases has been definitely shown to be composed of basophilic elements, the lesion in 1 instance having been clinically predicted before its postmortem verification

While there is every reason to concede that a disorder of somewhat similar aspect may occur in association with pineal, gonadal or suprarenal tumors, the fact that the peculiar polyglandular syndrome described may accompany a basophil adenoma in the absence of any apparent alteration in the suprarenal cortex other than a possible secondary hyperplasia, will give pathologists reason in the future to scrutinize more carefully the anterior pituitary for lesions of similar composition

Diagnosis—Fourteen examples of this peculiar and clinically unmistakable polyglandular syndrome have been re-

ported recently by H Cushing (J A M A 99 281 (July 23) 1932) The disorder—pituitary basophilism—is characterized by a rapidly acquired plethoric adiposity affecting the face, neck and trunk, the extremities being exempt In women it is associated with hypertrichosis and amenorrhea Other features of the condition are hypertension, purplish striæ distensæ of the abdomen, and acrocyanosis with cutis marmorata of the extremities In 6 of 11 cases that had come to autopsy, an unsuspected pituitary adenoma was found Three of the growths were unmistakably composed of basophilic elements

It is not an uncommon syndrome. Numerous typical examples have been reported, the disease in most instances having been ascribed to a primary adrenal disorder for the reason that cortical hyperplasia is a not uncommon postmortem observation In its extreme forms, the malady has more often been encountered in young adults, and the average duration of life in the fatal cases has been something over 5 years

C Mazer and L Goldstein ("Clinical Endocrinology of the Female," W B Saunders Co Philadelphia, 1932) likewise call attention to the fact that small adenomas may exist in women who never come to operation, and whose only complaints are referable to the pelvic organs The eye examination in this class of women discloses contraction of the visual fields

Another case of basophilic adenoma of the pituitary (pituitary basophilism-Cushing syndrome) was recently reported by R C Moehlig (J A M A 99 1498 (Oct 29) 1932) The patient, a woman aged 43, had a pituitary basophilic adenoma which was verified postmortem There was adiposity, confined largely to the face, neck and

trunk; vascular hypertension, hyperglycemia, purpura-like ecchymoses with spontaneous bleeding into the skin, polycythemia, leukocytosis, multiple joint pains; marked hirsutism, with a livid countenance and masculine characteristics, small stature (5 feet) and small extremities, polyphagia and polydipsia, occasional edema of the extremities; dry skin; acroparesthesia, dyspnea with choking, vertigo and blurring of vision, insomnia; headaches, nervousness and palpitation of the heart, and increased basal metabolism Symptoms appeared after bilateral oophorectomy and hysterectomy performed 9 years before

An operation for a toxic adenomatous goiter accompanying this condition was found necessary, and resulted in death 16 days later, with psychosis and symptoms of myocardial failure

At autopsy the pituitary body was found symmetrically enlarged, 1.75 by 1 cm, and on cut section showed a small circumscribed area of whitish gray tissue about 2 cm in diameter (adenoma) Microscopically, there was a diffuse adenomatous hyperplasia of the pituitary body, including both the basophilic and the eosinophilic elements In one area of the anterior lobe a rapidly growing basophilic papillomatous neoplasm was observed Bone from the skull appeared normal

PLEURA, DISEASES OF.—ADHESIONS.—E

Tarantola (Riv di Patolog e Clin d Tuberc. 6 473 (June) 1932) states that pleural adhesions occur more frequently on the upper and smaller lobe of the tuberculous lung and especially at the apex or the posterolateral surface up to the interlobar space Occasionally the site of the adhesions is at the base of the upper lobe The lower lobe is rarely a

site of adhesions but its superoposterior, upper and diaphragmatic surfaces are sometimes predisposed to them. Adhesions seldom occur on the median lobe. They are frequently found between the leaves of the interlobar pleura. The sites of adhesions are found, as a rule, on those parts of the lungs presenting tuberculous lesions. Adhesions are often spread by the action of the pneumothorax, but they do not act harmfully on the underlying parenchyma.

CYSTS.—*Hydatid Pneumothorax.*

—According to L. Barnett (Brit J Surg 19 593 (Apr) 1932), approximately 10 per cent of the hydatid cysts occurring in the human body are found in the lungs. Many of these are located deep in the pulmonary substance, in the neighborhood of the hilus, and before they are very large, rupture into a main bronchus, thereby bringing about in quite 80 per cent of the cases a spontaneous and lucky cure—a process of evacuation by paroxysmal expectoration. Some persist, especially those peripherally located, and in the course of years grow to the size of an orange, an ostrich egg, or even larger, and bulge from the pleural envelope of the lung. These large cysts sooner or later undergo complications and cause serious troubles which call urgently for surgical relief. The complication of pneumothorax due to the rupture of a pulmonary cyst into the pleural cavity, with coincident opening into a bronchus, is decidedly uncommon.

Dévé, of Rouen, who writes learnedly and exhaustively on this as on most other aspects of echinococcus infection, has been able to collect records of not more than 41 cases up to January, 1931.

The case to be described is a true example of hydatid pneumothorax, with the added complication of secondary

hydatid cysts growing from the pleura and in the lung. The primary cyst in the lung ruptured into the pleural cavity about 8 years ago and was evacuated by operation, but unfortunately not until 4 months had elapsed from the date of rupture. The resulting fistula, since a break-through into a bronchus had also occurred, is still running and occasionally discharges a small cyst. Other cysts or fragments of cysts are at rare intervals expectorated. The affected lung, which had collapsed and had become crowded by air-pressure against the mediastinum, remained firmly adherent there and has never since expanded to any appreciable extent. Nevertheless, the patient is at the present time wonderfully fit, all things considered, despite occasional periods of disability.

Case Report—T. B., a sheep farmer from boyhood, was thrown from his horse on January 20, 1924. His age then was 47, and he had previously enjoyed the best of health. After lying dazed for a few moments, he picked himself up and with some difficulty remounted his horse, rode home, and went to bed. He slept but little that night, but in the morning he arose, and actually worked for an hour or more drafting sheep. He felt pain in the right shoulder and upper part of the right chest in front, and could use only his left arm in his work. He found himself becoming less and less fit for exertion, and on the fifth day after his accident consulted his physician.

On examination, no external evidence of injury was discovered, but all the classical symptoms and signs of a right-sided hydro-pneumothorax were present. Fluid reached to the level of the third costal cartilage, air filled the pleural cavity above this line, the heart apex was displaced $1\frac{1}{2}$ inches to the left, heart sounds were pure but rhythm slightly irregular, the pulse rate was 120 and the temperature 101° F (38.5° C), breathing was rather distressed, 32 to the minute, and the face somewhat cyanosed, but there was no cough nor expectoration until quite

a month had elapsed from the time of his injury. An x-ray examination confirmed the ordinary clinical findings, and the diagnosis arrived at was hydropneumothorax, resulting from laceration of the right lung. No abnormality was discovered in connection with the liver or kidneys or other organs.

With rest in bed and ordinary medical treatment the patient grew worse, breathing became more difficult, appetite was lost, and there was much windy distention of the abdomen. During the next 3 months the aspirating needle was used on 5 or 6 different occasions, some air at high pressure and slightly blood-stained fluid in quantity varying from 10 to 80 ounces (300 to 2400 cc) being drawn off, and much, though only temporary, relief thereby obtained. Microscopic examination of this fluid showed only red cells, lymphocytes, and polymorphonuclear white cells. No tubercle bacilli were found.

After the last aspiration the patient felt well enough to return to his home and attempt a little work, but as soon as the fluid and air accumulated again he became cyanosed, weak, breathless, and feverish. He noted now that the little bouts of coughing with the expectoration of small quantities of thin, watery, straw-colored, salty fluid, which had been occurring for about 2 months, were getting more troublesome. He was again x-rayed, without helpful result, and then hospitalized.

The case was clearly one of hydro-, now verging on pyo-, pneumothorax, with marked displacement of the heart to the left, as if from high pressure of the air in the right pleural cavity. Naturally in a hydatid country, with a patient exposed all his life to infection from sheep-dogs, the possibility—nay, the probability—of a ruptured hydatid was envisaged, and a positive complement-fixation test of the patient's blood lent considerable support to this diagnosis.

First Operation—On May 29, 1924, 4 months after the accident, an extensive operation was performed. Ether was administered intratracheally, but this method proved of no special service as the right lung remained collapsed and adherent throughout.

A portion $4\frac{1}{2}$ inches long of the eighth rib below the scapula was excised, and the right pleural cavity opened widely. The following conditions were noted: (1) twenty ounces or more of thin, yellowish fluid with numerous small daughter cysts the size of cherries and

peas floating therein, (2) a soft, tawny-colored, false-membrane like, thick, wet wash-leather coating the pleura, both parietal and visceral and embedded in this coating countless numbers of little cysts the size of shot and barley grains, (3) a ruptured cyst the size of a large orange protruding through a jagged laceration in its adventitia, and located at the bottom of the compressed right lung.

The adventitia, easily torn, was opened up more widely and the mother membranes and numerous daughter cysts were evacuated. All the fluid and debris in the pleural cavity were flushed, sucked, and mopped out, and the pleural lining and the inside of the cavity in the lung were carefully wiped over with 2 per cent formalin solution. No bronchial fistula could be demonstrated and there was no expectoration by the patient during the operation. Nevertheless, a bronchial fistula was present, as subsequent events proved, and its valvular action favoring ingress and impeding egress was no doubt responsible for the accumulation of air under pressure in the right pleural cavity, with consequent permanent collapse, compression displacement, and adherence to the right lung in the recesses of the mediastinum. Recognizing the probable existence of such a fistula, an effort was made, unsuccessfully, to obliterate it by puckering up and suturing the adventitia with chromicized catgut. The right lung was reduced to the size of an ordinary pear, and the right pleural cavity was extraordinarily large and empty. The vertebral column could be felt jutting into it as if the lung and mediastinal contents had been crowded out of their proper habitat over to the left side and had become solidly fixed there.

The wound was closed and a futile attempt to dispense with drainage was made, but a week later it was necessary to put in a tube owing to a recurrence of the former symptoms of embarrassed respiration and fever.

Bacterial examination of the fluid evacuated at the time of operation showed Gram-negative bacilli—no tubercle bacilli—and, on culture, a profuse growth of coliform bacilli which gave the sugar reaction of *B. coli*.

After recovering sufficiently from this operation, the patient returned home wearing a tube, which was removed and reinserted, and antiseptic irrigations were administered through it from time to time as occasion required. For a year this state of affairs per-

sisted and the patient's health was sometimes better and sometimes worse. Occasionally, a small cyst and fragments of membrane would be discharged from the sinus, and occasionally also similar material would be expectorated.

Second Operation—On December 17, 1925, owing to faulty drainage, the patient's condition was so unsatisfactory that another operation was performed. Two inches of 2 ribs in the vicinity of the sinus were removed, the pleural cavity again cleansed, some small cysts evacuated, and a larger tube inserted.

Third Operation—On January 5, 1926, it was again necessary to open into the pleural cavity. A very free incision was made to permit thorough exploration. The lung remained totally collapsed, but on probing into it in the region of the interlobar sulcus, a nest of small cysts was found and evacuated, the result, no doubt, of implantation of scolices at the time of the original rupture of the cyst in January, 1924. Again, the patient made a good recovery, and, as before, gained weight and strength and managed to do a fair amount of bodily and mental work. At intervals of a few months, however, trouble with the tube, poor drainage, sepsis, discharge of cysts by the fistula or by mouth, etc., would recur in greater or less degree and incapacitate him for a time. Thus he has gone on for several years. In 1929 he discharged 2 or 3 cysts of considerable size from the fistula and has been much better since.

From May, 1929, to February, 1931, the patient has been on the whole well. He has occasional rises of temperature, usually the herald of the appearance of cysts in the discharge. The right pleural cavity has progressively decreased, as shown by x-ray. About November, 1930, the patient reported that a swelling appeared in the neighborhood of the right breast, which went down rather quickly a day or two later, and a large cyst then appeared in the discharge. The swelling was not seen, but if this observation is correct, it would seem that there is some infection in the chest wall. The complement-fixation and Casoni reactions are still strongly positive. If at a later date there is reason to believe that the patient has overcome his hydatid infection, an attempt might be made to close the cavity by some plastic procedure, combined, if need be, with avulsion of the phrenic nerve.

Hydatid Pneumothorax in General—

In a typical case, the patient is a young adult—more often a man than a woman—whose occupation has brought him into close association with country dogs, and who has thereby become infected with one or more hydatid cysts as a result of swallowing ova of the *Taenia echinococcus*, and the stage is set for the subsequent course of events which takes place in the following way.

1 A univesicular cyst, as large perhaps as an orange, bulges subpleurally from the lower part of the right lung. Its adventitia, composed of a compressed and fibrosed layer of lung and pleural tissue, is particularly thin and lacerable towards the chest wall, and, as is usual in univesicular, nonsuppurating cysts, there are no protective pleural adhesions. Where the cyst abuts on the deeper regions of the lung towards the hilus, some of the larger bronchi are incorporated in the adventitia. The bronchial wall facing the cyst may be in places completely destroyed by a process of pressure-absorption exercised by the expanding cyst, but the lumen of the bronchus, owing to its epithelial lining, does not undergo organic occlusion. There are, indeed, one or more potential holes in these bronchi sealed only by the close coaptation of the hydatid ectocyst.

The blood-vessels of the adventitia, not being lined by epithelium, are mostly obliterated by pressure-fibrosis, but here and there a vessel of some size, capable of giving rise to considerable hemorrhage, may persist.

The membranes of the parasitic cyst, consisting of the thick, hyaline protective ectocyst lined by the thin germinal endocyst, are tightly pressed against the adventitia by reason of the high tension of the enclosed hydatid fluid. There is

no organic union between the parasite and its host—close coaptation suffices for the transference of nutriment by osmosis. The endocyst is dotted over with tiny brood-capsules just visible to the naked eye, and in these brood-capsules, and distributed also in the clear watery fluid, are myriads of microscopic scolices. The fluid and the scolices possess specific toxic properties.

2 The cyst ruptures. This event may result from an accident, even a slight accident, or from a violent respiratory effort such as coughing or sneezing, from muscular violence, or it may arise spontaneously. It is obvious that a cyst cannot go on enlarging indefinitely, and rupture is a common ending to the enlargement of a pulmonary cyst.

The thin adventitia on the pleural aspect of the cyst is torn open, and the parasitic membranes are similarly lacerated. Hydatid fluid is forced out into the pleural cavity, and coincidentally with this evacuation of fluid the mother membranes crumple and fall away from the adventitia. Thus, a deficiency or actual hole is laid open in the wall of one or more of the larger bronchial tubes incorporated in the adventitia. Through this hole some fluid hydatid debris and perhaps some blood may escape into the air-passages and be coughed up paroxysmally, and conversely some air, some bronchial mucus, and possibly some bronchial bacteria, may be drawn by inspiratory action into the cyst cavity, and thence into the pleural cavity.

It sometimes happens, as in the case described above, that, owing perhaps to the shape of the hole in the bronchus, or to a flapping tag of bronchial wall, or to a partly adherent plug of necrosed material, or to the crumpled mass of mother membrane, or to the irregular accordion-like collapse of the thin ad-

ventitia, that a valvular mechanism is introduced, permitting air to enter into the pleural cavity, but preventing its escape again by way of the perforated bronchus.

3 Thus arises a pneumothorax of high pressure and, in consequence, the collapsed lung is further compressed and crowded against and even beyond the mediastinum. If this displacement persists for many days, the lung becomes adherent—perhaps permanently adherent—in its abnormal location. The heart also is pushed out of position, the main veins, particularly the inferior vena cava, are kinked, and the circulation of blood through them seriously impeded. Thus the breathlessness, cyanosis and cardiac embarrassment that are characteristic of this type of pneumothorax can be accounted for.

4 In addition to the accumulation of air, hydatid fluid, fragments of membrane, scolices, a little bronchial secretion, possibly infected, and some blood escape into the affected pleural cavity. The outpouring into the pleural cavity of the toxic contents of the hydatid cyst may produce

(a) Sudden pain and shock, followed by anaphylactic symptoms (inconstant in nature and degree) such as pruritus, urticaria, fever, vomiting, delirium, collapse, etc.

(b) A defensive reaction in the pleura, with exudation of pleuritic fluid and the formation of a fibrinocellular false membrane coating the lung and walls of the pleural cavity.

(c) A secondary echinococcosis developing in the pleura and in the pulmonary tissue of the cavity formerly occupied by the parent cyst. This secondary development of cysts, which takes some weeks or months to manifest itself, is due to the dissemination of

scolices at the time of rupture of the fertile parent cyst, and their subsequent growth. As a surgical curiosity, it may be mentioned that the whole parent cyst intact has escaped into the pleural cavity and continued to grow there.

(d) Lastly, a septic infection is sooner or later introduced into so favorable a medium by contaminated mucus entering by way of the bronchial aperture, and the hydropneumothorax becomes a pyopneumothorax. The bacteria concerned are usually pneumococci, staphylococci, coli bacilli, and, occasionally, gas-producing anerobic organisms are superadded.

Diagnosis.—Early diagnosis is essential to successful treatment. Delay is disastrous, and, therefore, whenever a case of pneumothorax is encountered, particularly in a hydatid country, the possibility of hydatid origin should be taken into consideration. The mistake must not be made of concluding that if a pneumothorax is not traumatic, it must be tuberculous in origin. The tuberculous type is, of course, the commonest and it is usually correctly diagnosed; its clinical features, bacteriology, x-ray findings are all so manifest. In the hydatid type, except in the rare instances where tuberculous disease is combined, the usual tuberculous evidence is lacking. The case, therefore, should be viewed as out of the ordinary. Hydatid disease should be thought of and the aid of the laboratory invoked, for of late years the laboratory technic in this connection has made such marvelous progress that a correct diagnosis of hydatid infection is rendered possible in fully 90 per cent. of cases submitted. The tests most commonly and successfully applied are the *skin reaction of Casom* and the *blood complement deviation test*.

Treatment.—Needless to say, the sooner the patient is operated on the better. If immediately after the catastrophic rupture of the cyst, or at any rate within a few days of it, the thorax on the affected side is freely opened in a dependent position, the ruptured parasitic cyst and its contents completely evacuated, the pleural surfaces and the walls of the cavity formerly occupied by the cyst cautiously wiped over with ether or with 2 per cent solution of formalin in water, and the pleural and cyst cavities drained for a few days, the case is likely to do well. The cyst cavity obliterates, the bronchial fistula closes, the lung reexpands, the wound heals, and the patient may be completely and permanently cured.

If the bronchial fistula does not close, there will obviously be interference with the expansion of the lung and with the healing of the wound, with resulting chronic empyema. It may then be necessary to make efforts to close the bronchial opening by inserting puckering sutures of chromicized catgut in the freely exposed affected portion of the lung—also to disinfect the empyema cavity with Dakin's or some such antiseptic lotion—and eventually, if need be, resort to one or other of the recognized plastic operations recommended for the obliteration of a chronic thoracic empyema—extensive rib resections, decortication, and so on.

But suppose it happens, as in the case here described, that the ruptured hydatid cyst is not promptly diagnosed and operated on, then, in addition to chronic collapse and adhesion of the lung and probably persistence of a bronchial fistula, a further complication arises that adds enormously to the difficulties of successful treatment, *viz.*, the development of secondary cysts, as the result

of implantation and growth of some of the innumerable scolices disseminated at the time of rupture of the parent cyst. From time to time some of these secondary cysts break away from their moorings and escape, either by way of the air-passages in the form of hydatid expectoration, or by way of the external opening in the thoracic wall.

INFECTION.—G. Delamare, C. Gatti and R. Jimenez Goana (Arch. Med.-Chir. de l'App. Respir. 7. 239, 1932) think that the scarcity of pleural *fusospirochetosis* as opposed to the frequency of *fusospirochetosis* of the bronchopulmonary parenchyma is more apparent than real. They report a case of *fusospirochetal* infection of the left interlobar fissure in a syphilitic patient, aged 42, with a chronic cough. The onset was mild. The chief clinical symptom consisted in febrile attacks alternating with apyretic intervals of gradually increasing length. Puncture in the region of pain yielded a fetid pus with innumerable spirochetes and some fusiform bacilli. The fusiform bacilli were absent in a later aspiration but reappeared in small numbers later. The patient died after 7 months from a thoracoabdominal phlegmon. Necropsy confirmed the existence of a suppurating pocket in the left interlobar fissure with no apparent communication with the bronchi. Histologic examination revealed marked pleuropulmonary sclerosis of long standing and microbic accumulations in the bronchioles consisting of fusiform bacilli, spirochetes and streptococci.

The *fusospirochetal* bronchoalveolitis was characterized by the absence of parenchymatous necrosis and evidently originated from the pleural *fusospirochetosis*. The authors report a case of *fusostreptococciosis* of the left inter-

lobar fissure which was clinically similar to the *fusospirochetosis*. The onset was accompanied by tachypnea, tachycardia and chills, absent in the other case, and by more acute pain. In both cases the pus was fetid from the start and remained fetid.

The interlobar determination was preceded by chronic bronchorrhea in the first case, postanesthetic bronchitis in the second, and in both cases pleuritis of the large cavity with little or no exudate, origin of the pachypleuritis which finally covered the entire surface of the inferior lobe of both patients. The long duration of the disease and the alternation of short febrile attacks with long apyretic intervals is one of the major characteristics of interlobar *fusospirochetosis* and interlobar *fusostreptococciosis*. Anatomically, the sclerosing nature of the infections was the most important characteristic. The temporary dissociation of the Vincent's symbiosis in the first case, due to tracheal elimination of the fusiform bacilli and pleural elimination of the spirochetes, is important in interpretation of cases in which one or the other of the two bacteria is missing. Practically these 2 cases give the key to the etiology of certain deep suppurations with intermittent fever and to certain pleuropulmonary scleroses. Theoretically, they complete the heretofore fragmentary data on the spirochetes of pleural effusions.

EFFUSION.—Diagnosis.—R. L. Pitfields (J. A. M. A. 99. 582 (Aug. 13) 1932) offers a new method of detecting fluid in the pleural cavity. If the abdominal cavity contains fluid (over 800 c.c.), simple tapping of one flank with the fingers will produce vibrations or succussions which are detectable on the opposite side to the palpating fingers of the other hand.

If the fluid in the pleural sac is above a trifling amount (400 c c), percussing the area over it posteriorly with the slightly flexed fingers will cause repercussions or vibrations to be felt easily by the fingers of the other hand pressed against the lumbar muscles on the same side, about the level of the third lumbar vertebra. If both sacs contain fluid, waves produced on one side will not be transmitted to the other side. They will not cross the mediastinum. If the sac on one side is so distended with fluid that it is pushed over to the other side of the spine, producing the paravertebral triangle of dulness (Grocco's sign), percussing the fluid on the suspected side will produce vibrations in the triangular area. If the chest wall is bulged by an excess of fluid, the phenomenon is more marked because of the increased tension of the liquid, and repercussions will be detected like those felt on a drumhead.

In case of consolidation, as in pneumonia, without the effusion of fluid, percussion over the posterior walls of the chest (over the area of dulness) will not bring about these vibrations. The test seems to be a good differential sign between liquid and consolidated lung. The test must be performed with the patient sitting upright in order that the dependent fluid may be spread over the diaphragm. In examining patients with fluid in the pleura above the width of 4 ribs, observations in 20 cases were confirmed by aspiration or x-ray examination as well as other well-known signs.

The weight of the fluid in the pleural sac has much to do with the tension of the diaphragm, sitting upright increases this because the fluid is distributed widely over the diaphragm. These vibrations felt over the quadratus lum-

borum are sharp, rapid in the presence of fluid, and constitute a marked tremor. This weighted diaphragm, if the patient is sitting upright and leaning forward, will produce vibrations in the quadratus of the opposite side, because very often the collection of fluid is so massive that the diaphragm, so vibrating, excites both quadrati. From the diaphragm the vibrations are transmitted to the last rib, one of its insertions being to this member, through the arcuate ligaments. The upper insertion of the quadratus is to the last rib. This muscle is without doubt an accessory muscle of respiration. If the reader will but feel his quadratus muscle he will detect that it contracts violently when he coughs hard. It serves as a fixator to the diaphragm and can be looked upon as an extension of this member outside of the torso. Upon these anatomical facts the method depends.

The erector spinæ muscle in the thorax, if percussed, will often excite contractions in its lumbar portion, these contractions must not be confused with the vibratory tremor induced by percussed fluid. The quadratus is made tense if the patient leans forward, it does not contract, but vibrates when the chest is percussed. Leaning forward puts this muscle on the stretch, increases its tonus to the tension of a bow-string. This position is important. A stretched piece of parchment would vibrate if it was in the place of the muscle.

In heavily muscled men, sometimes the quadratus will exhibit slow heavy waves when the chest is percussed under the above conditions. Palpating the quadratus when the chest is percussed in the presence of fluid is the best way to distinguish these two kinds of vibratory phenomena. The waves are probably magnified in the quadratus because

the long diaphragm and quadratus make leverage effect when the chest is percussed. The last rib serves as fulcrum. Then, too, hydraulic phenomena have much to do with the magnification.

The upper level of the fluid may be determined by this method. If percussion is done over fluid beginning at the top, percussing downward, and palpating the muscle at the same time, the vibrations will begin to be felt when this level is reached. This method seems to be reliable in denoting this. With a cannula in the chest fluid proving its presence, it will be found that, by lowering the level from a previously determined top, by evacuating 30 c.c. the fluid diminished the width of 2 vertebræ, noted again by percussing the chest and palpating the quadratus. The method not only will locate the extent of the effusion, but will detect it as well. In this case the film of fluid between the ribs and the lung must have been very thin, because 30 c.c. covered the entire width of the lung. It appears from this observation that the method will prove the presence of very small amounts of fluid.

Pathological Physiology.—In discussing the importance of the respiratory movements in the formation and absorption of pleural fluids, R. C. Brock and E. A. Blair (*J. Thoracic Surg.* 1:50 (Oct.) 1931) describe in detail an apparatus which allows direct observations on a heart-lung preparation freshly removed from a dog, hooked up with an artificial circulation, placed in a glass "thorax" and made to "breathe" by a respiratory pump. By means of this set-up the exudate from each lung can be separately observed and collected for a period of several hours.

Under direct visualization, fluid can be seen to drip from an edematous lung.

It is suggested that the rise in negative pressure during the act of inspiration fills the subpleural lymphatics, and that when expiration follows, the filled lymphatics empty part of their contents into the pleural space. An edematous condition of the lung was produced by (1) pouring acidified fluid into the bronchi, (2) inducing passive congestion, and (3) causing an active inflammatory process with dilute chlorine gas.

It was discovered that in a living preparation the formation of a pleural effusion is dependent upon the respiratory movements, a finding which corroborates the conclusions previously drawn by Graham from experiments with dead lungs in an artificial thorax.

In the living intact animal, after an edematous condition of the lung had been produced by either the acidified fluid or the chlorine method, fluid could be collected by means of a cannula inserted into the pleural space. The rate of formation of this fluid was shown to be dependent upon the force of the respiratory movements and the associated pressure changes. A quiet, easy respiration produced a small effusion, whereas deep, labored breathing caused a much more rapid accumulation of fluid in the pleural space.

In addition to fluid of an inflammatory nature passing from the lung to the pleural space, it was found that ordinary Ringer's solution, if introduced into the bronchi and alveoli, will be made to pass into the pleural cavity by the respiratory movements. When part of a broth culture of streptococcus was added to Ringer's solution and introduced into the lung, the organism passed through the pleura with the fluid almost immediately and without the aid of cellular activity. It is suggested that this may be an important mode of infection in

the body and may explain certain septiciemias of obscure origin

Just as the rate of formation of fluid by the inflammatory lung was influenced by the character of the respiratory movements, so also was the rate of absorption of fluid by the noninflammatory lung. With quiet, easy respiration the absorption was slow, with deep, labored breathing it was much more rapid.

Treatment.—This subject is being given consideration in the surgical section because of the somewhat more elaborate method of treatment recommended in contradistinction to the simple method of aspiration so commonly practiced. E. T. Freeman, (*British M J* 2 140 (July 23) 1932) believes that the treatment of effusions as commonly practiced, often leaves much to be desired, because, aside from those of cardiac, renal or malignant origin, most are tuberculous in origin. "Those that begin insidiously and progress to a chest full of fluid are almost certainly so." He quotes Burrell as stating, from records, that 40 per cent of such cases develop pulmonary tuberculosis later, and also quotes Norris and Landis as giving the records of the large American insurance companies, which show a 3 times greater mortality from pulmonary tuberculosis in people who have suffered from pleurisy within 5 years prior to insurance than in those not having had the disease. "It should be remembered that the pleura is invaded from the lung, and that the disease, active or not, already exists in the pulmonary tissue when a pleural effusion has formed and that in dealing with a pleural effusion one is dealing with a serious condition, and that anything that will lessen the risk of subsequent active pulmonary tuberculosis is a matter of fundamental importance."

He quotes passages from modern texts

which advise slow withdrawal of fluid, and cessation of aspiration on the appearance of troublesome cough, severe pain, albuminous expectoration and edema, the acute disturbances of removal, but, in addition, he stresses the fact that the dangers of spread of tuberculous infection, and rupture of the lung, even when great amounts have not been withdrawn, are seldom mentioned, nor are the disadvantages from pulmonary fibrosis and basal adhesions, when absorption has long been delayed, given consideration.

Gas replacement is advocated because it answers the necessary requirements

- 1 It should cause no danger or distress to the patient

- 2 It should insure as far as possible against the spread of pulmonary disease

- 3 It should aim at total emptying of the chest—to prevent basal fibrosis

By gas replacement, simultaneously with the fluid aspiration, "the dreadful shock involved by the sudden expansion of the collapsed lung and the shifting of the mediastinum" is avoided.

In the usually practiced aspiration, the writer feels that the size of the chest is never considered, either in relation to the volume of fluid that may be withdrawn or the degree of pulmonary collapse that will be produced by a given volume of fluid in chests of given capacities.

The presence of the replacing gas prevents the reexpansion of the lung (which occurs slowly as it is absorbed) and allows time for the healing of a pulmonary focus and for watching the pulse and temperature, so that a permanent pneumothorax may be maintained if the disease is found to be active in the lung. Oxygen is recommended if immediate reexpansion is desirable, but it seems to

the writer that the longer period of rest, following the slower absorption of air, is of distinct advantage

The method advocated is one of aspiration of fluid in 50-c c units, and replacement of air in 45-c c amounts, the lessened bulk of air allowing for the gas expansion produced by the higher body temperature

Anesthesia is accomplished by local injection, time for anesthetic effect being insisted upon to avoid pleural shock. After several units have been withdrawn, the evident gas bubble at the upper limit is tapped, after local anesthesia, and a water pressure manometer attached. The pressure is read and air-filling continued as before, until the chest is dry, keeping the pressure in the manometer at a constant figure. This method entails the insertion of a second needle in the upper part of the chest, the advantage of which is that the pleural pressure may be watched and kept constant all through the operation

A much simpler procedure may be carried out with 1 aspirating trocar only, replacing the fluid with two-thirds of its volume of air. When the fluid is all withdrawn, the valve used is turned, a manometer connected to the trocar by an adapter and the pressure read. If positive, the pressure is adjusted by the slow removal of air until a pressure between 0 and -4 is obtained

PNEUMONIA. — ETIOLOGY AND PATHOGENESIS.—J W Pierson (Am J Roentgenol 27 572 (Apr) 1932) calls attention to the fact that fats and oils often reach the alveoli of the lungs when they are administered to children either orally or through the nasopharynx. They collect in large masses in the lungs and are associated with chronic pneumonias and fibrosis

The widespread use of oils in pediatrics offer a large potential source for this condition. The presence of fatty material in the lungs produces an interesting x-ray picture without pathognomonic signs

Avirulent *R pneumococci* derived from S forms, of a specific type may be changed, according to J L. Alloway (J Exper Med 55 91 (Jan) 1932), by growth in broth containing anti-R serum and a heated, filtered extract of S pneumococci of a different type, into virulent S organisms identical in type with the bacteria extracted. This has been accomplished in the case of R strains derived from Type II pneumococci, by the use of extracts prepared from Type III and Type I S forms. The constituents of the extract supply an activating stimulus of a specific nature in that the *R pneumococci* acquire the capacity of elaborating the capsular material peculiar to the organisms extracted

An epidemic that occurred in an orphanage and was due to a Type I pneumococcus is described by A Strom (Norsk. mag f. laegevidensk. 92 1208 (Nov) 1931). This pneumococcus was found not only in the sputum, but also in cultures from the nose and throat, during the disease and up to 73 days after the crisis. During the epidemic 33.3 per cent of the well contacts were carriers and 2½ months later 16.9 per cent were. The strains from patients were more virulent to mice than were those from carriers

PATHOLOGY.—B A Gouley and J Eiman (Am J M Sc 183 359 (Mar) 1932) present 9 cases of acute *rheumatic fever* with reference to the pathologic changes in the lungs. Eight of these showed an acute inflammation of lung tissue with consolidation; the

ninth showed pleurisy with subacute lung involvement. All of these cases were associated with acute rheumatic heart disease. The inflammatory pulmonary reaction consisted of an interstitial perivascular exudate of large endothelioid cells, identical in morphology with those found in rheumatic heart lesions and considered pathognomonic of rheumatic fever. Hemorrhage and fibrinous exudate were prominent features. In many virulent cases, therefore, a characteristic rheumatic pneumonia is to be found.

K. Germer (*Ugeskr. f. Læger* 94: 857 (Sept.) 1932) reports that blood tests on 8 patients with croupous pneumonia, 23 with bronchopneumonia, and 5 with pulmonary tuberculosis, were made for quinine and atoxyl resistant lipase, with a determination of the icterus index in every case. An increase in quinine-resistant lipase was found in 47 per cent of the cases. In grave cases of pneumonia there is usually a secondary toxic hepatitis. While a positive *liver lipase* reaction is, as a rule, accompanied by an increased jaundice reaction, the two reactions are not absolutely parallel. In 16.5 per cent of the cases there was an increase in the *pancreatic lipase* of the blood. There is a marked relation between the patient's general condition and the content of pancreatic lipase in the blood. In 4 fatal cases, histologic examination of the liver and pancreas revealed a close agreement between the amount of liver and pancreas lipase in the blood and the pathologico-anatomic changes in the liver and pancreas.

F. Fremmel, K. J. Henricksen and H. C. Sweany (*Ann. Int. Med.* 5: 886 (Jan.) 1932) describe an extremely acute type of *Friedlander's bacillus infection*, the patient living only 26 hours from onset to death. The clinical signs

corresponded to those usually reported for the disease. The pathologic changes were those of an uncommon lobar pneumonia instead of a confluent bronchopneumonia, or a "pseudo" lobar pneumonia. The disease began by a rapid growth of the encapsulated microorganisms in the alveoli and smaller bronchi, causing an exudate rich in edema fluid containing scattered monocytes and irregularly placed fibrin, with an occasional hemorrhage into the alveoli. This aspect has only a gray to yellow-gray appearance grossly, and accounts for the infrequent appearance of the red stage of hepatization. Death occurred before the other stages could develop. Ordinarily, the evolution of the lesion from the "red" stage is characterized by an infiltration of polymorphonuclear leukocytes along the alveolar walls, forming in crescents along the plugs composed of bacilli, monocytes and varying amounts of fibrin. Later, an invasion of the alveolar wall results in a huge dilatation of the alveolar capillaries, followed by thrombosis, necrosis and abscess formation. The last two processes correspond to the stage of resolution of pneumococcus pneumonia. The dilatation of the alveolar capillaries, with an occasional rupture into the alveoli, gives to the lesions a mottled dark red appearance that is occasionally present.

SYMPTOMS.—It is pointed out by H. Schade and H. von Pein (*Klin. Wchnschr.* 11: 713 (Apr.) 1931), that in inflammatory processes the hydrogen ion concentration is shifted toward the acid side. Tests on the sputum of patients with lobar pneumonia indicated that this is also the case in pneumonia. Discoloration of blood is produced by the transformation of hemoglobin into hematin. This transformation is ef-

fectured by acidity, even by comparatively slight degrees. Spectroscopic analysis of the *rustbrown sputum* in pneumonia reveals a hematin spectrum, which, in view of the acidity and of the diapedesis, becomes understandable. The rust-brown color indicates a considerable acidity and small amounts of blood, both of which are characteristic for lobar pneumonia. For this reason, the rust-brown sputum can be considered pathognomonic for lobar pneumonia. However, in exceptional cases, the same conditions may also occur in bronchopneumonia.

TREATMENT — Laboratory Methods — N Plummer (J Lab and Clin Med 17 594 (Mar) 1932) states that during the past few years, pneumonia has been the subject of extensive investigation, but most of the discoveries have not yet reached the stage of practical significance. Perhaps the most important advance toward the solution of this problem has been the chemical fractionation of the pneumococcus. This information has recently been applied by Avery and Dubos to the development of an enzyme that splits the carbohydrate fraction of the Type III pneumococcus and by so doing destroys the toxicity of this organism. Already these scientists have been able to protect mice against the Type III pneumococcus infection, and it is probable that this agent will be of value in the treatment of pneumonia. The majority of pneumonia patients today are not given the benefit of typing, even when the advantages of type diagnosis are so striking, as shown by the following example. Two pneumonia patients with the same amount of lung involvement and the same degree of toxemia are seen late in their infection. Assume that one is a Type I with a negative blood culture and

the other a Type III with a positive blood culture. The Type III patient will almost certainly die, the Type I has a good prognosis, and, if given the benefit of an efficient therapeutic agent, such as concentrated serum, will almost certainly recover. In the up-to-date management of pneumonia, the sputum should be carefully examined and rapidly typed as a guide to prognosis and to insure the prompt administration of serum in types in which it has been found efficacious. Blood cultures and other laboratory procedures should be instituted in order to recognize early the presence of septicemia and other complications. In short, it is evident that the modern treatment of pneumonia is dependent on the utilization of the latest bacteriologic and immunologic methods.

Direct Method of Typing Pneumococci — The technic used by W R Logan and J T Smeall (Brit M J 1 188 (Jan. 30) 1932) for the direct typing of pneumococci is practically that described by Armstrong, the sputum emulsion being substituted for the mouse peritoneal exudate. An emulsion of the sputum is made with physiologic solution of sodium chloride. Four thin glass slides are marked I, II, III, and Control, and a large loopful of the undiluted type serum is placed on the appropriate slide, a drop of physiologic solution of sodium chloride being put on the control slide. The sputum emulsion is then taken up in a capillary pipette with a teat. A drop of the required size is placed beside each drop of serum and then mixed by tilting the slide backward and forward. Sometimes it is better to drop the emulsion on to the serum, in other cases, in which the consistency is more gelatinous, it is necessary to mix with a loop. A thin cover-glass is placed on the mixture, which is then examined under the microscope. The authors use a $\frac{1}{2}$ oil-immersion lens, with the substage condenser racked down a little and the diaphragm closed to an extent which has to be constantly varied to obtain the best results. The plane mirror and a bright artificial light are employed. In cases in which pneumococci are present in large numbers, the

swelling of the pneumococci and the appearance of the dark line sharply outlining the capsule, along with a darkening of the body of the pneumococcus itself—distinct from the whitish, sometimes almost greenish-white, capsular substance—are strikingly seen when the homologous serum has been used. In the other slides, the pneumococci are seen to be much smaller, with a small halo which is a little lighter in color than the surrounding sputum substance, but there is no dark line sharply defining the outline of the capsule. In specimens in which pneumococci are scanty, it is sometimes only in the slide with the specific type serum that they stand out and become recognizable, while, in specimens containing many streptococci in diplococcal form, again it is only the reaction to the specific serum that indicates which are pneumococci. With some specimens the test has to be performed several times before a successful result is obtained.

R. R. Armstrong (*Ibid.*, p. 187) reports a rapid method by which pneumococcal type could be decided within 4 hours. The method consists in intraperitoneal inoculation of a mouse with the pneumonia patient's sputum. Four hours later the peritoneal contents are sampled by aspiration, the fluid obtained is mixed on a slide with type-specific agglutinating serums, and type is determined by microscopical examination of the fresh mixtures.

A number of tests made during the present season have proved, so far without exception, that type can be decided with ease and certainly by direct test on the patient's sputum, without recourse to mouse inoculation.

Procedure—A suitable fleck of sputum is selected. Three small samples of this are placed, equidistant, on a microscope slide, and numbered 1, 2, and 3. Each sample is emulsified with 4 times its volume of the corresponding diagnostic serum, the addition of serum and emulsification being conveniently performed with a platinum loop. Cover-glasses are applied, and the slide is set aside for a few minutes. A further sample from the selected fleck of sputum is smeared on a slide, fixed by heat, and stained by Gram's method. The general bacterial flora of the sputum and the number of pneumococci present are apparent at a glance in the stained

film, which exactly represents the characters of the sputum samples selected for the diagnostic test. It is of special value to be informed in advance of these characters, for if the pneumococci are plentiful, a positive result in the typing will be apparent at once, no time need be wasted in useless search, therefore, when, as in the case of a Group IV infection, there is no reaction.

The slide carrying the fresh emulsions of sputum and specific serums is now examined, using a 4 ocular, $\frac{3}{8}$ objective, and plane mirror, the condenser being removed. Whereas the unstained pneumococci, when present in small numbers, are but just visible in the case of a negative test, the result in the case of a positive reaction is a conspicuous increase in the size of the individual pneumococcus, due to conjugation of coccus and homologous antibody. The enlarged cocci have a characteristic ground-glass appearance, with a highly refractive peripheral zone. A positive reaction is at times appreciable to the naked eye on holding the preparation to the light. The positive, as compared with its companions on the same slide (which serve as controls), is seen to be opalescent, due to the great increase in size of the "sensitized" cocci. When the pneumococci are thickly coated with seromucinous pneumonic secretion, the characteristic appearances develop more slowly as the specific serum soaks its way through. In such cases 20 minutes may elapse before full completion, although type may be distinguished much sooner by the change in those pairs which are floating free.

It is to be noted that type is decided independently of actual agglutination of the pneumococci, which is prevented, presumably, by the viscous nature of the sputum. These sputum elements are digested in the peritoneal cavity of the mouse, the cocci are freed and multiply rapidly, so that agglutination takes place in the presence of specific serum.

Commentary—The results of the "direct test" have been confirmed in every case by mouse inoculation, and by the other more deliberate methods in common laboratory use. The direct method has proved trustworthy; its value lies in extreme simplicity and swiftness. The objection now disappears that pneumococcal type cannot be de-

cided in general practice, since animal inoculation is no longer essential, and a special knowledge of bacteriological technic is not necessary.

Generally speaking, the later a case of pneumonia is examined, the more profuse the sputum and the more numerous the pneumococci, immediate typing as described is then a matter of minutes. Thus, no time is lost in the intravenous administration of serum to the patient. On the other hand, early in pneumonia the sputum may be scanty and the pneumococci few. More care is required in making the test, and a second examination may be necessary. At this stage, however, a little delay does not materially affect the patient's chances of recovery.

Type may be decided with equal ease and speed by the direct method in the case of cerebrospinal fluid, pus from empyemata, aural discharges, etc.

Artificial Pneumothorax.—According to J. J. Coghlan (Lancet 1:13 (Jan. 2) 1932), the induction of artificial pneumothorax on the affected side in acute lobar pneumonia has the advantage that it (1) separates the inflamed pleural surfaces, relieves pain, and allows of easy respiration; (2) puts the inflamed lung at rest, and (3) limits the flow of blood through the pneumonic lung, thereby diminishing anoxemia and interfering with the passage of toxins into the general circulation. From the experience gained in 6 cases, the first and most obvious clinical result was that the induction of artificial pneumothorax initiated a series of events almost indistinguishable from the crisis which normally occurs in this disease. The second conclusion was that this control of the pneumonic process is at first only temporary, persisting merely as long as air remains in the pleural cavity. Since the

absorptive capacity of the pleura in this disease is abnormally high—a factor which had not been suspected at the beginning of the investigations—the time taken to absorb the air is a matter of hours only, after which the pneumonic process becomes reestablished at its original level. By adequate refills, however, this return of the disease can be forestalled, and when the artificial pneumothorax control has been maintained for a sufficient length of time (48 hours appears to be approximately correct), the pathologic process is definitely brought to an end, the air can be absorbed without any tendency to relapse, and convalescence proceeds normally. Resolution in the successful cases occurred more rapidly than usual, probably because, as the time of the disease was shortened, there was less damage done to the lungs and less exudate formed in the alveoli than if the pneumonia had been allowed to run its full course to a natural crisis. A striking feature of all the cases was the rapidity of the onset of the artificial crisis, profuse perspiration set in almost as soon as the pneumothorax needle was withdrawn, and cyanosis and dyspnea were relieved in about 15 to 30 minutes at most, causing corresponding subjective improvement. The fall of temperature was well established in from 2 to 3 hours, and the patient lost that appearance of acute distress characteristic of pneumonia. The following routine is proposed for average cases: (1) preliminary medication 1 hour before induction with $\frac{1}{4}$ grain (0.016 Gm.) of morphine. (2) Thorough local anesthesia with procaine hydrochloride down to and including the parietal pleura. (3) Very thorough asepsis during induction. (4) A preliminary fill of from 400 to 600 c.c. of air, run in very slowly during the

negative phase of the pressure swing cycle, and with the needle clipped off during the high positive phases (5) A second fill, 12 hours later, of from 300 to 500 c c of air (6) If the pneumonic process is not completely controlled, a third fill of from 100 to 150 c c of air,

cases of lobar pneumonia in infants and children occurring over a period of 10 years Attention is called to the frequency of lobar pneumonia in the earlier period of life in contrast to the general opinion of its infrequency The following is a partial résumé of their statistics

		No of Cases	Per Cent
Sex	Boys	69	60 0
	Girls	47	40 0
Age distribution	First year	29	25 0
	1 to 5 years	66	57 0
	6 to 12 years	21	18 0
Seasonal variations	June 1 to Aug 31	19	16 4
	Sept 1 to Nov 30	22	18 9
	Dec 1 to Feb 28	37	31 9
	March 1 to May 31	38	32 8

which may be given in another 12 to 18 hours (7) Simultaneous exhibition of a suitable diaphoretic and of Felton's serum in appropriate cases at the discretion of the operator Owing to the profuse perspiration, the comfort of the patient is much enhanced by warm sponging as needed and nursing between blankets In cases in which it is deemed inadvisable to provoke defervescence by crisis, and a gradual fall by lysis is aimed at, 3 fills of from 100 to 150 c c, at intervals of 6 hours, might be given and further treatment judged by results No special points with regard to after-treatment were noted Two patients were given blow-bottles with the idea of promoting reexpansion of the lung and absorption of any residual air, but this did not seem to be really necessary or to be of any particular advantage

In 50 instances the onset was sudden, in 64 insidious, and in 2 it was not known Fever was the initial symptom recorded in 47 of those with sudden onset, 1 started as an "acute abdomen" and in 2 coughing was the only symptom noticed. Cough was noted as having occurred in 77 and in 39 there was no mention of it Vomiting occurred at the onset in 39 of the patients

The fever was not so characteristic as in adults In 51, the temperature dropped by crisis and in an equal number by lysis Nine had a pseudocrisis and of these, 6 later had a true crisis

Age	Crisis (51 Cases), No of Cases	Lysis (51 Cases), No of Cases
Under 1 year	8	12
1 to 5 years	31	31
6 to 12 years	12	8

The lobar involvement was as follows

Right upper	31
Right middle	14
Right lower	31
Left upper	14
Left lower	42
Central pneumonia	4

PNEUMONIA IN CHILDREN.

—A statistical study of lobar pneumonia has been made by C G Grulee and P Mulherin (J Pediat 1 593 (Nov) 1932), who have collected 116

In 17 of the cases more than one lobe was involved. The x-rays confirmed the clinical diagnosis in 85 of the 116 cases.

The following complications were noted.

	No of Cases
Otitis media	32
Preceding pneumonia	13
During pneumonia	19
Empyema	3
Unresolved or delayed resolution	3
Pyelocystitis	3
Hemorrhagic nephritis	1
Subcutaneous abscess	1
Meningitis	1
Encephalitis	1

There were 7 deaths in this series, all of which occurred in infants under 15 months of age.

Age	Mortality	Per Cent
Under 1 year	6 in 29 cases	20.8
1 to 5 years	1 in 66 cases	1.5
6 to 12 years	0 in 21 cases	0.0

According to S. Engel and T. Doxiades (*Ztschr f Kinderh* 53:213 (July 22) 1932), the incidence of lobar, or as they termed it croupous-cyclic, pneumonia is greater in infancy than has generally been believed. Without x-ray examinations the diagnosis is frequently missed because of the mild symptoms. The "cyclic" febrile course, with sudden onset, cessation by crisis as well as its well defined limits, is so characteristic that together with the x-rays the typical syndrome of croupous pneumonia is presented and there should be no difficulty in distinguishing it from bronchopneumonia. He admits the possibility of "transition" cases. No proven cases were seen before the fourth month of life, although he believed that certain cases which were observed in the second and third months of life were of the croupous type. Undoubted cases oc-

curred in children of 4 and 5 months of age. The prognosis in uncomplicated cases was good. However, the mortality is higher in infants than in older children because of the serious consequences of pleuritic complications.

That atypical pneumonias, which are typical neither of bronchopneumonia nor of lobar pneumonia, but which have points in common with each, occur in children between the ages of 1 and 3 years, is asserted by E. Kramár (*Monatschr f Kinderh* 50:414, 1931). He suggests that such types of pneumonia may be the result of a transition in the development of immunity. Early in life when immunity is at its lowest, diffuse and septic pneumonias are more common. The "transition" type occurs during the stage of immunity development, but when it is still incomplete. Later, when immunity is more definitely established, the infection takes the form of a limited lobar involvement. In a subsequent publication (*Arch f Kinderh* 94:81 (Sept 11) 1931) he summarizes his animal and immunobiologic experiments upon which he bases the above hypothesis.

The difficulties in distinguishing between low-grade atypical nontuberculous pneumonia and *pulmonary tuberculous lesions* in children is cited by G. Remé (*Monatschr f Kinderh* 50:297, 1931). When the tuberculin reaction is negative, the writer concludes that these cases are nontuberculous and terms them "creeping" subacute pneumonia because of their resemblance to tuberculous lesions. She also suggests that such lesions may occur in children with positive tuberculin reactions but here, of course, it is difficult to distinguish definitely between the 2 conditions.

It is a well-known fact that the early stages of lobar pneumonia may simulate

an acute attack of *appendicitis*, and particularly in children the differential diagnosis may be difficult. R. Kochmann (Arch f Kinderh 97 157 (Sept 9) 1932) suggests that the two diseases may coexist and reports 2 such instances. The one, an infant of 3 months, died from a perforated appendix.

One of the important epidemiologic factors in the transmission of pneumonia is demonstrated in the work of S. M. Shultz (Am J Hyg 15 80 (Jan) 1932). She determined the incidence of pneumococcus carriers by cultures from the throats of 86 persons, representing the families of 21 children with pneumococcic pneumonia. In 11 instances she demonstrated the same type of pneumococcus in the supposed carrier as in the "contact" pneumonia patient. There was no significant variation in the virulence of the two, in those cases in which it was compared. The duration of the carrier state was followed in 35 convalescent children and was found to vary between 2 and 152 days.

TREATMENT.—The value of nursing care in the treatment of children with pneumonia is emphasized by R. Kochmann (Arch f Kinderh 96 14 (Mar 4) 1932). So impressed was he with the value of adequate nursing care, that during 1930 all serum and medical therapy was abandoned and entire reliance was placed upon nursing procedures. A total of 78 children with lobar and bronchopneumonia were treated in this manner with a mortality of only 13 per cent (10 patients). Twenty-nine of these children were under 1 year of age and of these 5, or 17 per cent, died.

Cough mixtures in the treatment of lobar pneumonia in the young child are apt to do more harm than good, accord-

ing to C. G. Grulee (J Kansas M Soc 33 280 (Aug) 1932). Many of these mixtures are not only irritative, but nauseous, and tend to hinder the much-needed nutritional therapy. The author also has the impression that children who receive opiates do not do so well. The physician should determine whether the continuation of the cough or the therapy would be the more disturbing. In a great many instances of lobar pneumonia, the cough is not a particularly serious symptom. If it is decided that medicine is needed for the *cough*, a simple form of opiates, such as *codeine* or even *morphine*, should be used, and not one of the more nauseous mixtures.

Artificial pneumothorax has been successfully used in the treatment of bronchopneumonia in infants by S. Popowski and R. Stankiewicz (Rév franç de pédiat 7 619 (Oct) 1931). They recommend its use in unilateral bronchopneumonia, with or without interlobular exudate, and in chronic bronchopneumonia in which there is a tendency to bronchial dilatation. They advise against its use in bronchopneumonia accompanied by an abundant expectoration.

POLIOMYELITIS (INFANTILE PARALYSIS).—NATURE OF DISEASE.—While H. Pette (Arch Neurol and Psychiat 27 974 (Apr) 1932) denies that the lymphatic system plays any major part in spreading the poliomyelitis virus, M. T. Burrows (Arch Int Med 48 33 (July) 1931) insists that the disease is primarily a lesion of lymphatic apparatus of the body. He believes that lymphoid hyperplasia is the fundamental pathologic process, that the Peyer's patch is the commonest focus, and that at least 75 per cent of patients suffering from

poliomyelitis never show any nervous system symptoms. It is true that research data generally stress the neurological findings, but it must be remembered that experimental physiologists usually inoculate the virus directly into the central nervous system, a portal of entry not available *in vivo*. The inadequacy of quarantine methods is due to the fact that most victims of this disease have lymphatic symptoms only, and are, therefore, not recognized as having the disease. Burrows would thus revise the entire concept of infantile paralysis. In his opinion, the weakness of the extremity is merely the unusual end result of a generalized lymphatic infection. The respiratory symptoms which commonly precede the attack are presumably part of this picture, although H. Demme, in his report to the German Neurological Society (*Arch of Neurol and Psychiat* 27 972 (Apr) 1932), cites evidence to show that it is an entirely independent disease which merely lowers resistance so as to permit entry of the poliomyelitis virus.

EPIDEMIOLOGY.—The epidemic of 1931, according to B. C. Hecht (*M J and Rec* 135 19 (Jan 6) 1932) represents the forty-third recorded outbreak of sizable proportions of acute anterior poliomyelitis in America and the Continent.

While it is generally acknowledged that the apparent immunity to infantile paralysis enjoyed by most adults is due to subclinical attacks during childhood, the time during which these latter occur has not been established. The report of the Boston investigators (*Editorial, J A M A* 98 405 (Jan 30) 1932) of a survey of the epidemic in Bedford, Massachusetts, seems to have demonstrated the fact that this immunization does not occur during epidemics,

but takes place rather during the inter-epidemic periods.

ETIOLOGY.—That syphilis may cause an acute as well as a chronic form of poliomyelitis is evidenced by the citation of a case by W. W. Chrisman (*Amer J Syph* 16 308 (July) 1932) whose patient presented all the clinical symptoms of an acute attack of infantile paralysis, but whose spinal fluid showed definitely the picture of cerebrospinal lues.

(A) **Predisposing Causes.**—The youngest patient in the series reported by B. Hecht (*loc. cit*) was 3 months old; the oldest was 27 years of age. The maximum number of cases of poliomyelitis fell into the age group ranging chiefly between 3 months and the age of 5 years, with the greatest number occurring up to the age of 3 years.

However, according to M. W. Wells (*New York State J Med* 32 393 (Apr 1) 1932), there has been a tendency in recent years toward an increase in the incidence of acute anterior poliomyelitis in the older age group of persons. In the analysis of the outbreak of acute anterior poliomyelitis in San Francisco in 1930 made by J. C. Geiger and J. P. Gray (*J Prev Med* 6 145 (May) 1932), more cases of the disease occurred in the age period of from 5 to 9 years than in any other 4-year age period. Of the 268 cases of the disease occurring in the 1930 epidemic in San Francisco, M. A. Limper, H. E. Thelander and E. B. Shaw (*J Prev. Med* 5 475 (Nov) 1931) state that 26.8 per cent. of the patients were over 16 years of age. E. C. Rosenow (*J. Infect Dis* 30 377 (May-June) 1932) reported an epidemic of the disease among college students.

Blood Grouping.—O. Grooten and N. Kassovitch (*Compt rend Soc de biol.*

105 428 (Nov 21) 1930, 106 1059 (Apr 16) 1931), from a study of blood grouping in 78 cases of poliomyelitis, concluded that (Moss) Group II (Landsteiner 'A') has a relatively high degree of susceptibility to poliomyelitis, Group IV ('O') was the other group of frequent occurrence. They found no representative Group I ('A B') among their cases. C W Jungeblut and E T Engle (Am J Dis Child 43 523 (Feb) 1932) presented evidence that those belonging to Group III ('B') were apparently more resistant to poliomyelitis than members of the other 3 groups. E B Shaw, H E Thelander and K Kilgariff (J Pediat 1 346, 1932), from a study of 100 cases of the disease, found that the representation of Group II ('A') and Group IV ('O') was roughly within expected limits, although Group IV seemed somewhat commoner in active cases. Group III was only slightly less frequent than the figures usually given as normal. However, there was found to be a complete lack of Group I ('A B') in their series. While the authors could draw no conclusions from their study, it was pointed out that the evidence suggested by their series of cases, in agreement with that of Grooten and Kassovitch, is that Group I ('A B') is less susceptible to poliomyelitis.

Climate—According to S Matthiasson (Norsk mag f laegevidensk 93 949 (Sept) 1932), in an epidemic occurring in Iceland in 1924 there were 463 reported cases giving an incidence of 4.6 per thousand inhabitants, a poliomyelitis morbidity unparalleled in the literature.

Race.—In a series of 137 cases of poliomyelitis analyzed by B Hecht, only 5 occurred in the negroes. The author points out that before concluding that a

natural immunity exists in the negro race, careful consideration must be given to the possibility of the existence of invisible racial barriers. It is possible that racial segregation tends to minimize the spread of the infection to negro quarters.

Season—In San Francisco, and California generally, J Geiger and J Gray (*loc cit*) state, cases have been reported in every month of the year. The periods of the recent epidemics have been, in 1921, from July through November, in 1925, from May through November, in 1927, from July through December, in 1930, from June through the following March. It is highly probable, according to the authors, that this trend in prolonged periods of higher incidence is influenced by the California climate.

Sex—The disease has long been recognized as occurring more frequently in the male than the female. In the study of B Hecht (*loc cit*) the ratio of male to female patients was 6.4, in that of J Geiger and J Gray (*loc cit*), male patients also outnumbered the female 3 to 2.

Siblings—In 128 females where infantile paralysis occurred, B Hecht (*loc cit*) states there were 9 families in which 2 members of the household were affected. In the light of the observations of Draper regarding the constitutional make-up of the siblings affected, a careful survey of the cases was made. In only 1 family out of the 9 was there any suggestion of similarity between the siblings.

(B) **Specific Causes**—According to M L Cooper (Tr Am Pediat Soc 43 32, 1932), studies of the etiologic factor of poliomyelitis have revolved around the filtrable virus, the globoid body, and the streptococcus.

E Rosenow (*loc cit*) isolated a pleomorphic streptococcus having a peculiar infecting power, specific immunologic properties and characteristic velocity. This organism was obtained from the throats and spinal fluid in frank and abortive cases of the disease, from the throats of a large proportion of their fellow well students, and from the milk of healthy cows in the dairy at the time of the epidemic.

M Cooper (*loc cit*) isolated green-producing streptococci from the spinal fluids of 65 per cent of the cases of poliomyelitis studied. In the majority of instances, flaccid paralysis and death of the rabbits occurred when either concentrated spinal fluid or culture of it were injected intracerebrally. Streptococci were recovered from the brains of the rabbits. Streptococci were also obtained from the brain of rabbits which had developed paralysis and died 6 to 7 weeks after having had their nostrils packed with sterile gauze saturated with a solution of the culture. Human convalescent poliomyelitis serum afforded complete protection to the streptococci. Filtrates of these streptococci, after passing through the finest Berkefeld filter, were sterile. Rabbits remained normal when injected with the filtrate.

Ruth Richardson and R. R. Mellon (Proc Soc Exper Biol and Med 29 451 (Jan) 1932) have found that 2 strains of streptococci recovered by Rosenow from cases of anterior poliomyelitis in human beings are, at certain phases of their growth, filtrable through Berkefeld N candles. The filtrable forms, however, produced negative results when injected intracerebrally into monkeys. One of the authors (Mellon) suggests that, as a result of the altered conditions brought about in the host by the *virus*, there is dissociated *in vivo* a

form of streptococcus which reacts specifically with the host.

TRANSMISSION.—E Rosenow (*loc cit*) has reported an epidemic of infantile paralysis among college students which apparently was *milk-borne*. New cases abruptly ceased to occur when the raw milk was discontinued.

PORTAL OF ENTRY.—In infantile paralysis, the superficial abdominal reflex is lost or modified in whole or in part, often before somatic paralysis appears. Theoretically, then, the loss could not be due to a spinal nerve involvement, but might be due to sympathetic nerve involvement. Since J. H. Toomey (Proc Soc Exper Biol and Med 29 868 (Apr) 1932) believes that infantile paralysis is essentially a disease of gastrointestinal origin, the possible connection between the sympathetic system and the gut were given consideration. Experiments with autonomic drugs were performed to show this connection.

R. S. Saddington (Proc Soc Exper Biol and Med 29 838 (Apr) 1932) fed a macacus cynomolgus monkey virus-infected milk for 6 days. Symptoms first appeared 11 days after the last feeding. The left leg finally became completely paralyzed and the right leg became quite weak.

P. F. Clark, D. J. Roberts and W. S. Preston, Jr (J Prev Med 6 47 (Jan) 1932), on the other hand, failed to produce poliomyelitis in monkeys of this type either by oral administration of large quantities of the virus or by the injection of 10 c.c. of the virus containing material, into a loop of the small intestine.

E. W. Hurst (J Path. and Bact 35 41 (Jan) 1932) states that it has previously been shown that after intracerebral, intranasal and intraneural

inoculation into monkeys, the virus of poliomyelitis spreads mainly by the axis-cylinders and that the cerebrospinal fluid plays a minor part in disseminating infection. Since poliomyelitis may also follow intrathecal inoculation, the author investigated this mode of infection. Frequently with intrathecal inoculation the earliest lesions were situated in the floor of the fourth ventricle, into which under the conditions of experiment this virus regurgitated at operation. Evidence was again obtained that the axis-cylinders determine the subsequent dissemination of the virus which had penetrated the nervous tissue.

Considering the pathogenesis of human poliomyelitis, it was concluded that no evidence at present available speaks against an axonic entry of the virus or necessitates the participation of the cerebrospinal fluid in its spread through the nervous system.

INCUBATION PERIOD — According to J. E. Gordon (J. A. M. A. 99:1043 (Sept. 24) 1932), the incubation period is not well defined, but epidemiologic evidence indicates ordinarily a period of from 7 to 14 days, the seventh to the tenth day being most common. According to S. Matthiasson (*loc. cit.*), the incubation period of the disease occurring in Iceland in 1924, varied from 7 to 10 days.

The clinical course of poliomyelitis according to Gordon (*loc. cit.*) is divided into 3 periods: (1) the *initial* or *systemic* stage; (2) the *central nervous system* period; (3) the *paralytic* period. The first two stages fall into the prodromal or preparalytic period.

1. **THE SYSTEMIC STAGE** — The initial stage, Gordon states, represents a general systemic reaction and presents no known characteristics which definitely qualify the illness as poliomyelitis.

Physical findings during this period, according to R. W. Meals, and A. G. Bower (J. Lab. and Clin. Med. 17:409 (Feb.) 1932) are often negative. Gordon points out that the important symptoms include *fever*, *headache*, and gastrointestinal disturbance, commonly *nausea* and *vomiting*. *Diarrhea* may be a symptom, but *constipation* occurs more frequently. In the study of Geiger and Gray it was found that of the cases that could be classified definitely, the gastrointestinal type of onset was the most frequent, vomiting and constipation, or both, constituting the most prominent signs in the clinical picture. *Diarrhea* was uncommon. Of the 350 patients studied by Meals and Bower, who were admitted to the hospital on the fourth day of the illness, 92 per cent were constipated, 2 per cent had diarrhea, nausea was present in 60 per cent, and vomiting in 40 per cent. Vomiting occurred in 53 per cent of the patients studied by Hecht. According to this author, there seems to be no relationship between the gastrointestinal symptoms and the severity of the infection. The most frequent type of onset in the series of Geiger and Gray was that characterized by symptoms of *respiratory infection*.

Poliomyelitis, according to Gordon, may or may not progress beyond the initial phase. In the event that it does, a latent period usually intervenes before symptoms of clinical progression become manifest. This interval ranges from 1 to 4 days and occasionally is as long as 1 week. About one-third of the patients studied by S. O. Levinson, Clarice McDougall and W. Thalheimer (J. A. M. A. 99:1058 (Sept. 24) 1932) were of this "dromedary" type with the latent, symptom-free, interval. The latent period, however, may not be a feature

at all, according to Gordon, the clinical course being rapidly progressive. Furthermore, the disease may begin with the second phase mentioned by Gordon. In addition to the gastrointestinal and the respiratory type of onset, over 6 per cent of Geiger and Gray's cases were characterized at the onset by symptoms due to involvement of the central nervous system. In about one-fifth of their patients the symptoms at the onset were indefinite. In a large percentage of their patients, the onset of the disease was characterized by a combination of gastrointestinal, respiratory and central nervous system symptoms. Respiratory symptoms occurred in about 24 per cent of the cases reported by Hecht. A history of sore throat was obtained in 40 per cent of the cases studied by Levinson, McDougall and Thalheimer (*loc cit*). Hecht also states that *cervical adenopathy* occurred in 41 per cent of the patients, an incidence similar to that reported by other investigators.

2. CENTRAL NERVOUS SYSTEM PERIOD—This second clinical phase is characterized by preparalytic involvement of the central nervous system. *Fever* and *headache* are present, having returned once more if the onset has been of the "dromedary" type. The temperature, according to Hecht, is never alarmingly high, usually ranging from 100° to 103° F (37.8° to 39.4° C). Of the patients studied by Meals and Bower, 70 per cent complained of frontal headache, while only 34 per cent. of those patients observed by Hecht complained of this symptom. Hecht, however, points out that because of the age of most of the cases, all patients cannot complain of this manifestation. The incidence of headache parallels the increasing age of the patient; under 2

years there were no cases with headache, from 2 to 3 years there were 2 cases, from 3 to 5 years, 5 cases, from 5 to 10 years, 11 cases, among those patients over 10 years of age, 18 complained of this symptom.

Drowsiness, according to Gordon, is a prominent feature of the second phase and signifies involvement of the meninges. Drowsiness occurred in 46 per cent of the cases analyzed by Hecht. The patients are also *fretful* and *irritable*, particularly when handled, such manifestations occurred in 63 per cent of Hecht's patients.

Neck rigidity was observed in 95 per cent of the patients of Meals and Bower, and in 74 per cent of those studied by Hecht. The latter states that *rigidity of the spine* usually accompanies that of the neck. Pain in the neck and lumbar region was mentioned in only 32 per cent of the patients observed by Meals and Bower. Pain on anteflexion of the spine, these authors state, was a constant finding. According to Hecht, *hyperesthesia* and *nerve trunk pain* are often difficult to differentiate. Hyperesthesia occurred in 21 per cent of his patients and nerve trunk pain in 21 per cent. Vasomotor disturbances, such as the *tache cérébrale* and sweating, especially about the head, are usually pronounced, according to Gordon. Hecht, on the other hand, states that his patients did not show a high percentage of vasomotor manifestations. As a rule, his patients who had marked perspiration, had high fevers.

The superficial abdominal and cremasteric reflexes are among the earliest altered, their absence is of significance. The deep reflexes tend to be hyperactive early in the disease and later depressed or absent, Gordon further states that inequality of the reflexes on the two

sides is important. *Ataxic tremors* or *twitchings* of the muscles of the extremities are of later development, and if exaggerated in a particular muscle group may indicate the site of the future paralysis. Tremors variable in character, were observed in 50 per cent of the cases under the observation of Levinson, McDougall and Thalheimer. G Draper (J A M A 97 1139 (Oct 17) 1931) stresses the occurrence of ataxic tremors and muscle twitchings in early stages of the disease, considering that these signs point to a stimulating process preceding the destructive phenomena of the fully developed disease process.

Signs—According to Jean Macnamara and F G Morgan (Lancet 1 469 (Feb 27), 527 (Mar 5) 1932), the most valuable sign is the *spine sign*. By this is meant disinclination to flex the spine anteriorly because of the pain involved by the movement. *Amoss's sign* can often be elicited when the child is placed in a sitting position, the position assumed being that of a tripod, the child using both arms to support part of the body weight. The neck is regularly stiff, and yet when the patient is raised by the shoulders, the head drops backward and cannot readily be raised. This *head drop sign* was observed in 50 per cent of the cases seen by Levinson, McDougall and Thalheimer (*loc cit*). This sign, Gordon believes, is a feature not characteristic of such other infections of the central nervous system as meningitis and tetanus. According to this author, *Kernig's*, *Babinski's* and *Brudzinski's signs* are usually not demonstrated. Levinson, McDougall and Thalheimer found Kernig's and Brudzinski's signs positive in less than one-fourth of their patients. However, Meals and Bower state that pain on

anteflexion of the spine which was a fairly constant finding, was almost invariably accompanied by Brudzinski's sign. Furthermore, Hecht states that of all the neurologic signs Kernig's sign was the most constant, occurring in 39 per cent of his cases, Babinski's sign was rarely seen. While Draper has stated that a special type of child is as necessary as the specific virus itself for production of the disease, Hecht was unable to verify this observation. Aside from a tendency toward a robust, healthy individual, the latter author could not find enough confirmatory evidence to agree with Draper's *constitutional type*.

3 PARALYTIC PERIOD—If paralysis develops, it usually occurs by the third day of the second period. In one of Gordon's cases, paralysis was delayed until the twelfth day. This paralytic stage does not present the confusing problems of the preceding periods. Irritability gradually disappears during this period as the temperature drops and the skin and muscle hyperesthesia lessens.

TYPES—Of the various types of infantile paralysis commonly recognized, the abortive and bulbar types should be considered.

Abortive Form.—According to Hecht, it has been estimated that there are at least 35 to 60 per cent of abortive cases in every epidemic. Abortive cases of the disease are generally considered to be responsible for an increasing immunity in the population with increasing age. However, the status of abortive poliomyelitis has been somewhat shaken. According to S D Kramer (J A M A 99 1048 (Sept 24) 1932) and S D Kramer and W L Aycock (Proc Soc Exper Biol and Med 29 98 (Oct) 1931), a group of

children who had passed through minor illnesses characterized by headache, fever and vomiting which occurred coincidentally with an epidemic of poliomyelitis, failed to show a higher percentage of specific protection bodies in the blood than did 2 control groups. Kramer states that the evidence presented indicates that immunity may follow exposure to the virus without evidence of the disease.

J. R. Paul, R. Salinger and J. D. Trask (J. A. M. A. 98:2262 (June 25) 1932) state that common usage of the term abortive poliomyelitis has proved so ambiguous that, in order to define the issues in the disease, they have employed the term *characteristic minor illnesses* in association with poliomyelitis. The symptomatology of some of these minor illnesses is more or less characteristic but not specific, being essentially that of an acute infection of short duration.

In a survey of 222 families in each of which one or more cases of poliomyelitis have occurred, the authors found that, coincidentally with the onset of the known cases of poliomyelitis, characteristic minor illnesses developed with a high degree of frequency in other children of susceptible ages. Thus, in the group 1 to 4 years, 39 per cent of the children with familial exposure developed a minor illness and in the age group of from 5 to 9, the incidence was 32 per cent. In 60 control families the data obtained showed that while the epidemic prevailed, the incidence of similar minor illnesses was about 9 per cent among children under 10 years, who had not been exposed to familial cases of poliomyelitis. The authors conclude that strong evidence seems to indicate that minor illnesses, which are evidently more frequent than has hitherto

been suspected, have a common causal relationship with orthodox poliomyelitis.

Bulbar Type.—The bulbar signs, although uncommon, may occur in epidemic form, such an epidemic is reported by W. G. S. Brown (Lancet 2:1287 (Dec 12) 1931) who describes a series of cases in a British school, in which no spinal symptoms developed, all the patients suffering from bulbar involvement with cranial nerve signs. The latter developed in every instance during the first week of the disease. Spinal fluid uniformly showed a pleocytosis without alteration in the chloride content. Another small but unusual epidemic is reported by A. Lichtenstein (Deutsche med. Wchnschr. 57:54 (Jan 9) 1931) whose patients all developed a purulent meningitis with pus in the spinal fluid, apparently due to the poliomyelitis virus.

These patients, according to Levinson, McDougall and Thalheimer (*loc. cit.*), have a much shorter prodromal history, in some not more than 24 hours. Patients of the bulbar type are found to have the greatest toxicity in the early stage, their illness is accompanied by *severe prostration*. In a series of 96 patients studied by Hecht, 15 bulbar cases occurred. A very typical method of onset of bulbar cases, Hecht states, is with *difficulty in swallowing or speech*. This progresses to *difficulty in respiration*.

Difficulty in respiration is, of course, not always due to involvement of the respiratory center in the medulla. J. L. Wilson (New England J. Med. 206:887 (Apr 28) 1932) points out that there are 3 mechanisms by which respiratory failure may occur: (1) direct paralysis of the primary respiratory muscles, (2) interference with respiration occurring in patients with pharyngeal paralyses in

when respiration is continually interrupted by unswallowed secretion collecting around the glottis, (3) a disturbance of the nerve centers in the medulla controlling respiration

LABORATORY FINDINGS.—

Blood—Blood counts on the patients studied by Meals and Bower ranged from 6000 to 18,000 with an average of 13,000, 59 per cent of the cells were polymorphonuclear leukocytes. H. E. Thelander, E. B. Shaw and A. Limper (Am. J. Dis. Child 42 1117 (Nov) 1931) also observed that a slight leukocytosis was present with a relatively high polymorphonuclear count

Cerebrospinal Fluid.—Gordon states that if one or more of the important physical signs are present, stiff neck, rigid spine and ataxic tremor, lumbar puncture should be done. The fluid, according to Gordon, is usually increased in pressure. It is relatively clear, but often presents a ground-glass appearance. The usual range of cells is from 50 to 100 per c mm. Some fluids have fewer than 50 and others as many as 2000. In the cases studied by Meals and Bower, 70 per cent of the spinal fluids were under increased pressure, and the cell counts ranged from 0 to 1083 per c mm, with an average of 87 cells per patient. In 12.86 per cent of their patients the spinal fluids were negative cytologically, but the patients were found to have characteristic neurologic manifestations. On the other hand, 22 per cent of the patients had negative neurologic findings but were found to have conclusively positive spinal fluids. In Hecht's cases the highest cell count encountered was 1338, the lowest 8 cells per c mm. The usual cell counts were below 200 per c mm, and of these the majority of the determinations were below 50 cells. Thelander, Shaw and

Limper state that in a series of 122 cases of poliomyelitis the cell count of the spinal fluid varied from 10 to 700, with the greatest number of cases between 50 and 200 and about an equal number of cases below 50 and between 200 and 300. The number of cases decreased rapidly with cell counts over 300. The high percentage of cases with bulbar involvement was thought to possibly account for the large group with a low cell count.

Meals and Bower observed that the lymphocytes predominated in the fluid in 95 per cent of their cases. In 3 per cent of the patients the polymorphonuclear cells predominated, while in 2 per cent there was an equal distribution of both types. In early involvement, according to Gordon, neutrophilic polymorphonuclear leukocytes predominate, but more commonly during this period cells of the myelogenous and the lymphatic series are about equally distributed. Shortly the lymphocytes predominate and this is the usual finding in the pre-paralytic period. Hecht states that while the initial cells seen were the polymorphonuclear leukocytes, within 12 to 18 hours the cell morphology will show a preponderance of lymphocytes. Macnamara and Morgan (*loc cit*), too, point out that while the polymorphonuclear cells are increased early in the pre-paralytic stage, they disappear as the lymphocytes are increased until at the stage of paralysis only 5 to 10 per cent of the cells are polymorphonuclear. However, Thelander, Shaw and Limper found that about one-half of their cases had a polymorphonuclear percentage over 50, the peak of the curves being in the group from 50 to 75 per cent. This finding may have been due to the particular epidemic and to the technic of staining and studying the cells. The

percentage of the polymorphonuclear cells during the acute stage of the disease apparently was independent of the day of the disease. The return of the cell count toward normal, Hecht states, is very rapid. By the fourth week only 2 per cent of their cases still had a count above normal.

Globulin, according to Hecht, while varying in quantity, is almost always increased. Macnamara and Morgan state that globulin appears late in the pre-paralytic stage, does not reach its highest concentration until paralysis has occurred, and persists after the cell count has returned to normal. A characteristic colloidal benzoin precipitation test was present, according to Meals and Bower, in 79 per cent of the cases.

PROGNOSIS—Death.—In 96 cases studied by Hecht, there were 15 deaths due to poliomyelitis, with a mortality rate of 15.6 per cent. According to the author, it has been observed that in every epidemic of poliomyelitis the death rate adjusts itself and remains essentially the same in any given locality, no matter what the form of treatment.

Age.—An analysis of deaths in Hecht's cases by age group is as follows: Up to 2 years, 3 deaths; 2 to 5 years, 2 deaths; 5 to 10 years, 4 deaths; over 10 years, 6 deaths. In the study of Geiger and Gray the fatality rate was higher among adults than in the lower age group. The evidence tends to bear out the accepted statement that poliomyelitis bears a graver prognosis, both as to life and to severity, in the older age group.

Sex.—While in the cases reported by Geiger and Gray (*loc cit*) the ratio of male to female patients was 3/2, the ratio of deaths, however, approached 1/1.

Type of Case.—The bulbar type of the disease offers the worst prognosis.

In the series of 96 cases studied by Hecht, 15.6 per cent were of the bulbar type, which exactly equaled the death rate in the series of 15.6 per cent.

Mental Excitement.—Sudden mental alertness and apprehension in a child previously drowsy often indicates a grave prognosis, according to Hecht, either as to severity of the infection or even as to life itself.

Fever.—No relationship, according to Hecht, can be found between the height of the fever and the prognosis.

TREATMENT.—Therapeutic.—**Serum.**—E. B. Shaw, H. E. Thelander and M. A. Limper (*J A M A* 97:1620 (Nov 28) 1931) demonstrate the importance of early serum therapy. In a series of 53 patients treated in the early stages of the disease, only 9 developed persistent paralysis. Of the 39 cases treated after the onset of weakness, paralysis was persistent in 23. Similar results were found in Sweden by A. Lichtenstein (*Ztschr Kinderh.* 51:39, 1931), where the rate of persistent paralysis was 24 per cent among those treated with serum and 45 per cent among those not receiving such treatment.

(a) **CONVALESCENT SERUM Value of Convalescent Human Serum.**—While the experimental evidence on monkeys, according to O. Torian and M. Winter (*J Ped* 1:326, 1932), justifies the use of human immune serum intraspinally and intravenously in the treatment of human poliomyelitis, there is no definite proof of its value, contrary to a rather general belief. Meals and Bower (*loc cit*) state that while it is difficult to investigate the value of any therapeutic measure in this disease, which is too serious to permit of untreated controls, and which normally includes such a high percentage of spontaneous recoveries, it

was felt that the results seemed to warrant the method of treatment

W H Park (J A M A 99 1050 (Sept 24) 1932) concludes that the results of the observations on serum-treated and untreated patients in the preparalytic stage of poliomyelitis do not give any statistical proof that the serum has any value when given in cases after the cells of the central nervous system are involved. However, he states that the uniformly optimistic opinions of those who have not observed patients not treated with human convalescent serum cannot be entirely disregarded.

S D Kramer, W L Aycock, C I Solomon and C L Thenebe (New England J Med 206 432 (Mar 3) 1932), in a therapeutic test of the serum which more nearly approached a controlled experiment than any they had heretofore been able to make, failed to obtain statistical evidence that convalescent serum is effective. However, it was not possible to draw the reverse conclusion, namely that serum is of no value. While no conclusions could be drawn as to the efficacy of convalescent serum, the outcome of the study, according to the authors, justifies its continuation on a large scale.

Macnamara and Morgan (*loc cit*) state that the use of human immune serum in the preparalytic stage and given in adequate dosage, has given excellent results, as evidenced by a low mortality rate, a low average total paralysis and a strikingly low proportion of paralysis of the severe grades. Levinson, McDougall and Thalheimer (*loc cit*) while unable to ascertain the precise value of convalescent serum, felt justified in recommending its use in preparalytic poliomyelitis. According to these authors, until more rational and

effective therapy is advanced, convalescent or normal adult serum treatment should be continued.

Time of Injection—It is the consensus of opinion that to be effective, the serum must be given before the onset of paralysis. According to I J Sands (J Nerv and Ment Dis 75 616 (June) 1932), the serum should never be used 2 days after the onset of the illness. Levinson, McDougall and Thalheimer state that if a surplus supply of convalescent serum is at hand, it can be used for the problematic benefits of averting an apparently extending paralysis, since it is almost impossible to secure a surplus of convalescent serum, pooled serum from normal adults should be used. Macnamara and Morgan (*loc cit*) recommend that if the supply of convalescent serum is ample, its administration within 24 hours of the development of paralysis to a febrile patient is justified, and is usually followed by a fall of temperature and arrest of paralysis. Sands states that serum should not be used in bulbar cases because of likelihood of aggravating the symptoms. According to Levinson, McDougall and Thalheimer, while it might be innocuous to administer serum to bulbar or encephalobulbar cases, 3 of their 28 patients of this type of the disease had striking clinical improvement following serum therapy.

Method of Injecting Serum—Experimentally, B F Howitt (J Infect Dis 50 47 (Jan) 1932) has found that in monkeys in the preparalytic stage of the disease, the percentage of recovery from experimental poliomyelitis was greater when serum from convalescent monkeys was given intramuscularly than when it was administered by the combined intrathecal and intravenous method. However, J Grossman (M J and Rec 135

32 (Jan 6) 1932) injects 20 c c of convalescent serum intraspinally after withdrawal of an equal or somewhat greater amount of fluid and administers 55 c c intravenously or intramuscularly. The most nearly ideal method of neutralizing the virus, Sands states, is by means of blood transfusion, using a convalescent poliomyelitis patient as donor.

Hecht, too, recommends the combined intraspinal and intravenous or intramuscular injection. Since the mobilization of the highest concentration of antibodies is desired, it is a much better plan to give a large single dose than divided small doses. The average dose used by Hecht was 75 to 100 c c. I Pardee (New York State J Med 32 63 (Jan 15) 1932) recommends that, if necessary, the serum may be given every 12 hours—an intraspinal injection of 15 to 30 c c and an intravenous injection of 50 to 100 c c of serum. The average intrathecal dose given by Meals and Bower was 15 c c and the intravenous or intramuscular dose was 30 c c. The choice of method of administration of serum was determined by the stage of the disease, the severity of onset, the certainty of diagnosis, and evidence of central nervous system involvement.

If neurologic and spinal fluid findings indicate that the toxins have reached the nervous system, the authors state the serum should be given intraspinally, otherwise, the intravenous or intramuscular route is most logical.

In estimating the *dose* of serum required, Macnamara and Morgan consider the following points: the age and size of the patient, the degree of toxemia, the state of the epidemic, and the duration of the illness. The development of tremor and hyperesthesia suggests that already there is some involve-

ment of motor cells and sensory ganglia, these symptoms call for large doses of serum. The type of cells found in the fluid is of assistance in estimating the dose required. When almost all the cells are lymphocytes, paralysis is not far off, and the dose of serum should be increased.

The *initial dose* used by these authors was rarely less than 50 c c. After the cerebrospinal fluid had been allowed to escape, a slightly smaller quantity of serum was administered intrathecally, and the remainder of the dose was given intravenously. The patient was then reexamined 12, 18 and 24 hours later. If the dose had been adequate, though spinal rigidity persisted, the temperature fell and the general condition improved. If improvement had not been marked after 18 hours, the author considered that an insufficient dose had been given and a further 30 to 40 c c. were injected intravenously.

(b) ROSENOW'S SERUM — Previous experience with Rosenow's serum caused Meals and Bower to abandon it, Hecht, too, has discontinued its use. H J Hartman (M J and Rec 135 26 (Jan 6) 1932) recommends that if convalescent serum is not available, Rosenow's serum should be used. Hartman treated 5 patients with the serum. 2 of the patients were in the preparalytic stage, 1 in the early paralytic period, and 2 were in the acute paralytic stage proper, when first seen. The first 2 recovered without paralysis, the other 3 remained paralyzed.

(c) ANTIVIRAL GOAT'S SERUM — F Howitt (J Infect Dis 50 26 (Jan) 1932) found that prolonged immunization of 2 goats and a sheep with poliomyelitis virus over a period of years resulted in the development of antiviral substance which protected monkeys.

Forced Spinal Drainage.—G M Retan (J A M A 99 826 (Sept 3) 1932) treated 2 patients of poliomyelitis with forced spinal drainage. According to the author, 1 quart (1000 c c) of a hypotonic sodium chloride solution (0.45) per cent is injected intravenously over an hour's time. It is essential that the spinal fluid drip from the lumbar needle during the injection and for at least 1 hour after it is given. From a statistical point of view, a recovery of 2 cases is of no significance, but from a clinical angle, according to Retan, the behavior of the patient before and following the treatment may be of great importance.

Hyperesthesia.—In a large proportion of the cases with manifestations of marked hyperesthesia, W L Galland (Arch Phys Therapy 13 133 (Mar) 1932) states that absolute rest and freedom from irritation will effect a satisfactory subsidence of these troublesome sensory disturbances. For the patient who exhibits a prolonged persistence of hyperesthesia, the skilful use of x-ray therapy applied to the involved spinal segments will frequently cause a rapid disappearance of pain. Such treatments are given at weekly intervals, employing a 20 per cent skin erythema dose.

Treatment of Respiratory Disturbances.—Wilson treated 60 poliomyelitis patients with respiratory disturbances. The patients in this group were classified clinically according to the 3 mechanisms by which respiratory failure was brought about: (1) a direct paralysis of the primary respiratory muscles, (2) interference with respiration occurring in patients with pharyngeal paralysis, in whom inspiration is continually interrupted by unswallowed secretions collecting around the glottis; (3) a disturb-

ance of the nerve centers in the medulla controlling respiration. The first mechanism of respiratory failure occurs in the "spinal type", the other two occur in the "bulbar" form.

Twenty-three patients with paralysis of the respiratory muscles were treated in the "Drinker" respirator. Three died, all of pneumonia. Features believed to be of importance in the treatment of these patients were: (1) early, uninterrupted and prolonged use of the respirator, to avoid dyspnea or fatigue, especially in the acute stage of the disease, (2) painstaking care of the patients in the respirator in respect to frequent change in position, cleanliness of the skin, care of the bowels and, in patients who had also pharyngeal paralysis, postural drainage and the administration of parenteral fluids.

Forty patients with undoubted pharyngeal paralysis were treated. Therapeutic details of greatest value were: (1) avoidance of vomiting by keeping the stomach empty during the febrile periods and until hunger returns, (2) postural drainage; (3) aspiration of the throat; (4) adequate administration of parenteral fluids, and (5) in a few selected cases, tracheotomy.

Twenty patients with probable involvement of the respiratory centers or with sudden respiratory failure following an attack of choking, were treated in the Drinker respirator. Thirteen of these patients died. It is believed the respirator was an important factor in the survival of the others.

Hecht (*loc cit*) used the Drinker respirator in 16 cases. Of the 16 cases, 4 lived and 12 died. The patients who died all had the "bulbar" type of the disease.

Orthopedic Treatment.—S W Boorstein (M J and Rec 135 27 (Jan

6) 1932) divided the treatment into 3 stages (a) the treatment of the *tender* stage, (b) the treatment of the stage of convalescence, (c) the treatment of the stage of residual paralysis and deformity

(a) *Tender Age*—The best treatment for the patient during this stage is **rest**. Malposition must be eliminated, all the joints kept in proper anatomical position. Just how long this period of immobilization is continued cannot be arbitrarily fixed. According to Galland (*loc cit*) with the complete disappearance of hyperesthesia and muscle tenderness, and after it is evident that all acute manifestations have totally subsided, attempts must be made to rehabilitate the muscles.

(b) *Convalescence Stage*—Boorstein thought the information he derived from electrical tests is not worth the disturbance to the frightened infant. By patient, physical examination a fair idea can be obtained of what muscles have been involved and the degree of paralysis. At this stage, the development of deformities and depreciation of power of the partially paralyzed muscle must be guarded against and also, according to Galland, against muscle fatigue.

According to Boorstein, during the convalescent stage, approximately during the first 2 years, the following must be resorted to: (1) prevention of deformities by plaster and braces, which are dispensed with as soon as possible; (2) encouragement of natural exercise by providing apparatus to aid in proper sitting, standing and walking, (3) restoration of functions of the muscles by physical therapeutics in the form of **massage, heat, muscle training, heliotherapy, hydrotherapy, electricity**.

Muscle training, according to J. Grossman (*loc cit*) is most useful.

Passive movement of the part is the first step. The same passive movement is then performed against slight resistance produced by the patient. Next the patient performs the movement himself while the physician guides him along. Finally, the active movement is performed against the resistance of the physician.

Hydrotherapy.—According to C. L. Lowman (Northwest Med 31 136 (Mar) 1932), the greatest modern addition to the physical therapeutics of paralysis patients is the reeducation of the affected muscle under water in warm pools. The value of exercise with the body immersed in water lies in the fact that under such condition the extremities are virtually floating and motion can be carried out against a minimum of resistance.

(c) *Residual Permanent Paralysis*—A time is reached when there will be no further improvement and operative procedures become necessary. G. A. Williamson (Surg. Gynec. Obst. 54 953 (June) 1932) states that final operative treatment should not be undertaken until at least 2 years after the onset of the disease. Transplantation of tendons, according to the author, has not proved satisfactory in itself, as stability of the feet with freedom from painful lateral deformities is the most desirable end-result. An operation designed to fuse joints through which the deformity occurs should be performed.

PREGNANCY.—DIAGNOSTIC TESTS.—**Bladder Epinephrine Probe Test**.—A vasomotor phenomenon in the bladder for the early diagnosis of pregnancy is described by H. Hogler (Zentralbl. f. Gynak. 56 326 (Feb 6) 1932). This is based on *Muck's epinephrine probe test*. Muck's test on

the nasal mucous membrane of pregnant women revealed, during the early period as a rule, a sympathicotonic hypersensitiveness, but in the later months a vagotonic hypersensitiveness. These observations induced the author to make a similar test on the vesical mucous membrane, which he designates as the vesical epinephrine probe test.

Technic—The bladder is prepared as for cystoscopic examination. According to the advancement of the pregnancy, it is filled with from 200 to 300 of a 3 per cent solution of boric acid. Following the introduction and focusing of the ureteral cystoscope, a ureteral catheter is introduced and through this 5 cc of a mixture of 1 cc of epinephrine (1:1000) and 4 cc of a 3 per cent solution of boric acid is injected. The epinephrine is combined with the boric acid solution to facilitate a regular and rapid distribution in the bladder. A few seconds following this injection a noticeable ischemia appears on the floor of the bladder, which during pregnancy is hyperemic. After waiting 2 minutes, the ureteral catheter is advanced until its point touches the vesical mucous membrane, and 2 lines are drawn lengthwise over the fundus and the trigone. If the reaction is positive, there appears after about a minute a white streak sign, which is the result of vasoconstriction of the smallest vessels. The phenomenon disappears again after from 3 to 30 minutes.

The author performed this vesical epinephrine probe test on 250 gravidas and on 100 nonpregnant women. A tabular report shows that during the first few months of pregnancy the proportion of positive reactions was considerably higher (82 per cent in the second month) than during the later months (only 18 per cent in the ninth month). In nonpregnant women the reaction was negative in all but 5. The 5 with the positive reactions all had menopausal vasomotor disorders, and this is significant in that, as in pregnant women, there are frequently disorders that are similar to the menopausal vasomotor symptoms,

such as dizziness, nausea, fainting, sudden paleness and a sensation of heat or cold in the hands and feet. In general, the author's observations reveal that the abdominal sympathicus shows a behavior during pregnancy similar to that of the cerebral sympathicus, *i e*, in the first few months the sympathicotonic hypersensitiveness is more frequently demonstrable than during the later months. In women with a myomatous uterus the reaction is negative. It is likewise negative after the death of the fetus, and in tubal pregnancy.

Aschheim-Zondek Reaction—Excellent results have been reported with the Aschheim-Zondek pregnancy test in rabbits. Friedman and Lapham, Reinhart, Schneider and Scott, and many others have reported favorably upon the technic originally described by Friedman.

F J Schoeneck (Am J Obst and Gynec 23:712 (May) 1932) found that nonpregnant female rabbits at least 14 weeks old and 1500 grams in weight are satisfactory test animals for the application of the Aschheim-Zondek principle. He claims that the test is reliable in 90 per cent of cases within 24 hours.

At the beginning of his study he employed the very simple technic used by Schneider. This consisted of the injection of 5 to 7 cc of an early morning urine specimen of the patient to be tested into the ear vein of an immature female rabbit. The age of the animal was specified as 12 to 14 weeks. His results with this technic were not absolutely satisfactory. Several errors were encountered which seemed, in the main, to be due to 2 factors: the first of these appeared to be the faulty specification of the test animals. He found that some rabbits, though definitely of the age limit of 12 to 14 weeks, were too poorly developed to be satisfactory. The second

factor seemed to be explained by the disregard of the concentration of the urine as indicated by the specific gravity.

Schoeneck, to compensate for the latter, increased the amount of urine injected when the specific gravity was low. The technic was changed so that 5 or 7 c c were injected only when the specific gravity was above 1.025, 15 c c were used when the specific gravity was between 1.015 and 1.025, and 20 c c, when the specific gravity was below 1.015. These increased amounts were injected in 3 or 4 doses over a period of 4 or 6 hours.

In the matter of animals, he has changed the minimum requirement to 14 weeks of age and 1500 grams in weight. As Friedman has shown, however, any female mature rabbit may be used, provided she is not pregnant. At present Schoeneck is using immature animals of the above mentioned specifications, postpartum rabbits, or any female animal that has been isolated long enough to rule out pregnancy. If circumstances have not allowed an isolation of at least 3 weeks, he has laparotomized the animals to rule out pregnancy.

Animals are either autopsied or laparotomized at the end of 48 hours. Result is considered positive only if there is unquestionable evidence of fresh hemorrhage into one or more follicles. Where speed is the paramount issue, the 24-hour test affords close to 90 per cent efficiency.

Modified Aschheim-Zondek Test
—T. K. Brown (*Ibid* 23:379 (Mar) 1932) employs blood serum (of pregnant women) injected intravenously into female rabbits, resulting in development of hemorrhagic follicles and luteinization in the ovaries due to the presence of anterior pituitary hormone. This reaction may be observed more defi-

nately in the gross than is the case in the original Aschheim-Zondek test and in one-fourth and one-third of the usual time. He reports 220 tests performed by this method and results have proved correct in almost 100 per cent of the cases.

Two to 5 c c of serum is injected intravenously in the ear vein of the virgin female rabbit. Approximately 10 c c of whole blood are withdrawn and the serum is removed. The serum is allowed to stand for at least 4 hours or overnight before injection, as very fresh serum was found toxic and might cause death of the animal.

Rabbits weighing from 600 to 2150 grams were used, animals weighing between 1500 and 2000 grams giving the most constant results. A series of tests on smaller rabbits proved to be very unreliable. The rabbits were operated upon or autopsied from 24 to 48 hours after injection and the reaction could usually be determined by gross examination. Microscopic examination was used to check the gross findings. The rabbit could be used again at the end of 3 weeks. The earliest gross positive reaction was observed at 13 hours.

PSEUDOPREGNANCY.—Pseudopregnancy in animals can best be described from what occurs with the rabbit in which ovulation occurs 10 hours after coitus followed by fertilization and normal pregnancy. If ovulation follows sterile coitus, it produces instead a condition of pseudopregnancy which lasts from 16 to 19 days, in contradistinction to normal pregnancy of 31 to 32 days. During this period there are mammary gland changes with milk secretion. The mucosa of the uterus shows glandular proliferation and the corpus luteum formed is at first indistinguishable from the true corpus luteum of normal preg-

nancy D Macomber (J A M A 98 304 (Jan 23) 1932) reports the occurrence of true deciduoma in pseudopregnancy in 2 patients. In each case the husband was sterile and the patients passed a small amount of tissue from the uterus which was submitted to pathologic examination. The report showed well-formed decidua but no chorionic villi. In both cases menstruation was delayed and it would seem there had been a condition of pseudopregnancy similar to what occurs in the rabbit after sterile coitus. This would suggest that pseudopregnancy may occur regularly in the human female preceding menstruation. If ovulation is accelerated by coitus, a condition of pseudopregnancy might and probably often follows sterile coitus, as it did in 1 of these 2 patients.

COMPLICATIONS.—Anemias.—According to L E H Whitby (J Obst and Gynec Brit Emp 39 267 (Summer) 1932), anemia in pregnancy is common. In temperate climates the severe forms are rare. Severe anemia of pregnancy is not identical with Addisonian pernicious anemia, though the hematologic picture is somewhat similar in many of the pregnancy anemias. The hematologic picture may be "pernicious" (plastic or hypoplastic) or iron-deficient in type, or a combination of the two. The hypoplastic type is probably due to bone-marrow hypoplasia caused initially by a chronic anemia-producing condition, which is intensified by the pregnancy and results in an anemic breakdown. The chlorotic type is due to iron deficiency intensified by the pregnancy. The plastic type is due to failure to produce or utilize the hematinic factor, it may eventually become hypoplastic. Pregnancy anemias become most severe between the sixth and eighth months. Simple hematologic examinations are

recommended as a routine antenatal procedure at this period of pregnancy.

Pregnancy anemia may not manifest itself by definite clinical symptoms until after delivery. The hypoplastic type, and probably the plastic also, is progressive from one pregnancy to another. Sooner or later, the bone-marrow hypoplasia becomes so marked that recovery is tedious and difficult. The iron-deficient type is not necessarily progressive and is more easily recovered from.

Transfusion allows rest to the bone-marrow or supplies some factor and is the key treatment for the hypoplastic type. Liver and iron should usually be used as adjuvants and not to replace transfusion. Transfusion should accompany all operative procedures. Iron, with or without liver, will usually cure the iron deficient type. Liver alone will often alleviate the plastic type until after delivery, whereupon recovery occurs. Cases of severe anemia of pregnancy can, with careful supervision, be allowed to go to term, or near enough to give a chance of a living child. In the hypoplastic type, further pregnancies should usually be avoided or prevented. The ultimate *prognosis* for recognized cases of the hypoplastic type is quite good, but complete recovery may take a long time.

J F Wilkinson (*Ibid* 39 293 (Summer) 1932) describes several cases of true primary *pernicious anemia* in association with, but not due to, pregnancy. The patients had been under observation and treatment for several years and had kept in normal health. One patient with familial achlorhydria (and related to a patient with pernicious anemia) and 2 with latent pernicious anemia developed frank primary pernicious anemia as a result of the gravid state. Two cases of "pernicious" anemia of pregnancy are described. The patients had

typical blood counts for a primary anemia but had normal gastric secretions. Both were cured by suitable treatment, and relapses did not occur following discontinuance of this, although subsequent pregnancies were observed in one of them.

The author calls attention to the fact that a rapid and suitable form of *treatment* for both forms of pernicious anemia consists of the administration of 1 ounce (30 Gm) daily of **desiccated hog's stomach**. Patients with true primary pernicious anemia must continue this treatment indefinitely on adequate maintenance doses, patients with "pernicious" anemia of pregnancy are able to discontinue it after the blood count has returned to normal. A rapid and safe method of treating extremely severe pernicious anemia associated with pregnancy, with highly potent liver preparations intravenously, is described; it is particularly applicable when auto-hemagglutination is present. Relapses have not occurred during pregnancy in a series of 3 women receiving adequate treatment for primary pernicious anemia. This suggests that pregnancy can therefore be permitted in such women with pernicious anemia, provided suitable treatment is continued throughout.

R. D. Mussey, C. H. Watkins and J. C. Kilroe (Am. J. Obst. and Gynec. 24: 179 (Aug.) 1932) present a preliminary report of observations on secondary anemia during pregnancy. This is relatively common and there is a tendency for it to increase as pregnancy progresses. Usually secondary anemia may be classified into 2 general types, the most common of which is Type I. In fact, this type of secondary anemia seems to be true anemia of pregnancy, characterized by suppressed activity of bone-marrow early in pregnancy and by

evidence of hemolysis when the bone-marrow becomes more active in the later months. There is a tendency for patients to recover spontaneously after delivery. It seems probable that severe cases of this type of secondary anemia make up a large part of the cases formerly termed "pernicious" or "pernicious-like" anemia. It seems probable that the Type II anemia is present prior to pregnancy, grows worse during pregnancy, and persists after delivery. In the author's experience, the use of organotherapeutic preparations, such as extracts of bone-marrow and powdered fetal liver, was not followed by appreciable improvement in a group of patients with this type of anemia. However, the failure to obtain improvement may have been due to insufficient dosage or inability of the patient to take the product. The use of ferric citrate or ferric ammonium citrate in large doses, from 20 to 30 grains (1.3 to 2 Gm) 3 times a day, was followed by distinct elevation of hemoglobin in 75 per cent of a small group of cases.

Bacteriuria.—The results of bacteriologic urinalysis in pregnancy, labor and the puerperium are reported by G. H. Dodds (J. Obst. and Gynec. Brit. Emp. 38: 773, 1931). He found that 87.2 per cent of specimens of urine obtained from 793 antenatal, parturient and puerperal women were sterile, a colon bacilluria was found in 5.7 per cent, and bacteriuria due to organisms other than *Bacillus coli* in 5.05 per cent. From 406 consecutive antenatal patients, 88.6 per cent of specimens of urine were sterile, a colon bacilluria was found in 7.6 per cent, and bacteriuria due to organisms other than *B. coli* in 3.6 per cent. From 105 patients in labor, 94.3 per cent of specimens of urine were sterile; a colon bacilluria

was present in 47 per cent, and bacteriuria due to organisms other than *B coli* in 0.95 per cent. From 281 normal puerperal patients, 85.4 per cent of specimens of urine were sterile, a colon bacilluria was found in 4.9 per cent, and bacteriuria due to organisms other than *B coli* in 9.6 per cent. Twenty (26.4 per cent) of the 793 antenatal, in labor, and puerperal patients had inflammation of the urinary tract. Seven (11.8 per cent) of the 59 patients with morbid puerperia had inflammation of the urinary tract.

The author believes that the presence of a few pus cells, even in the uncentrifuged urine, is of no importance provided organisms are absent on culture. Pus cells in the uncentrifuged drop of urine are not of importance even though organisms other than *B coli* are found on culture. Pus cells and organisms in the uncentrifuged drop of a fresh catheter specimen of urine are diagnostic of inflammation of the urinary tract. If organisms are found on microscopic examination of the uncentrifuged drop, even though pus cells are found only in the centrifuged drop, an inflammation of the urinary tract may ensue. The danger of catheter infection, when the catheterization is carefully performed, is slight. Repeated examinations of patients with colon bacilluria showed, with 2 exceptions which may have been due to contamination, that the bacilluria was not temporary. The bacilli found at the successive examination were morphologically indistinguishable. Colon bacilli may be present in the bladder of pregnant women and not give rise to any clinical signs of inflammation. What happens depends on the virulence of the bacillus and the resistance of the patient. Repeated observations of patients with bacteriuria due to

organisms other than *B coli* showed, with 1 exception, that this bacteriuria was present on only 1 occasion. No relation was established between bacteriuria and parity, period of pregnancy, septic foci, toxemia, previous renal disease or morbid puerperium.

Chorea Gravidarum.—P. Willson and A. A. Preece (Arch Int Med 49:471 (Mar), 671 (Apr) 1932) present an interesting statistical study of chorea complicated by pregnancy, based on the analysis of 951 choreic pregnancies occurring in 797 persons, much the largest collection of cases thus far assembled. One case was personally observed by them, and the remainder were collected from the literature or through the medium of a questionnaire sent to more than 500 American obstetricians. Their study led them to the definite conclusion that the chorea occurring during pregnancy is identically the same disease as Sydenham's chorea in adolescents, modified slightly, in certain respects, by its association with pregnancy. The *prognosis* is much less grave than has heretofore been believed and seems to be improving, as the mortality rate of 12.7 per cent since 1900 is half of that obtaining prior to 1880.

Treatment.—The best treatment for the chorea, theoretically and from the standpoint of results obtained, consists of "rest, seclusion, careful feeding and gentle discipline" (Wall and Andrews). Nerve sedatives and morphine may be used, but sparingly and with great discretion. In mild cases there is undoubtedly no reason for therapeutic abortion. In severe cases the statistical evidence fails to show better results with intervention than without, in fact, the reverse is true. If resorted to at all, intervention should be by the induction of premature labor.

or abortion and, except in rare instances, not by immediate operative delivery, as the mortality in these procedures is about 50 per cent. Its most likely indication would seem to be in the case in which the patient is getting progressively worse, despite treatment, but before fever, leukocytosis, etc., give evidence of active and generalized infection, under the latter circumstances, it apparently does nothing but hasten the fatal outcome.

Glycosuria.—L. A. Chase (Canad. M. A. J. 26 297 (Mar.) 1932) found sugar in 66 of 100 urinalyses of pregnant patients. One patient who did 100 urinalyses found sugar 47 times. The earliest time in pregnancy that sugar was found was 2 months. Sugar tolerance curves were done on 3 pregnant patients and on 3 patients in whom glycosuria had persisted after delivery, the curves were similar to those found in persons with renal glycosuria. On the basis of her observations, the author concludes that glycosuria in pregnancy is normal. Its frequency depends on how thoroughly it is sought. It does not require dietetic treatment and probably does not predispose to the development of diabetes. It is differentiated from diabetes by the small amount of sugar present, by the absence of thirst, and by the presence of normal blood sugar curves.

V. J. Harding and D. L. Selby (*Ibid* 26 283 (Mar.) 1932) believe that if all pregnancies or a high percentage of pregnancies show glycosuria and are physiologic in character, it seems unnecessary from the purely clinical standpoint to distinguish between a glycosuria and a lactosuria, as usually recommended. If the distinction between dextrose and lactose were readily and clearly made, the authors would ad-

vise otherwise, on the grounds of completeness of data. In view of the uncertainty of the distinction by the present suggested tests, they think the wiser course is to assume the presence of a glycosuria.

Osteomalacia.—Osteomalacia is regarded as a rare disease by many authors, but if the medical literature from China and India is surveyed, it is evident that the disease is common in those countries. W. J. Dieckmann (Am. J. Obst. and Gynec. 23 478 (Apr.) 1932) believes that the condition, at least the early stage, is quite prevalent in this country.

In osteomalacia the calcium balance is usually negative, although in certain patients, the balance at times may be positive. There is a definite association between pregnancies at short intervals and insufficient or improper diet and the occurrence of pain in the symphysis, back and thighs, with difficulty in walking.

Treatment.—The diet of the pregnant woman should be carefully supervised in that it should contain as a minimum, 1.5 Gm (12 grains) of calcium and 2.0 Gm (30 grains) of phosphorus, sufficient butter and milk, fresh vegetables and fruits for the vitamin content. In many patients, especially where an economic problem exists, the diet should be supplemented with calcium and cod-liver oil. This applies in particular to the negro race. The result will be that the women will have less disability because of calcium deficiency and less decay and softening of teeth.

Toxemias of Pregnancy.—Attention is called by W. W. Herrick (Illinois M. J. 62 210 (Sept.) 1932) to the pathology of the toxemias of pregnancy and their end-results from the point of view of internal medicine. The toxemias may

be separated into early and late types. The former are characterized chiefly by pernicious vomiting; rarely by acute atrophy of the liver. They are probably without serious after-effects. The late toxemias are marked by albuminuria, hypertension, nervous and mental changes, edema, bilirubinemia, anemia, epigastric pain and tenderness, and convulsions, these symptoms appear singly or in any combination. These may have serious after-effects. Those in which the kidney is primarily at fault form a definite group. These are examples of a primary defect in the secreting mechanism of the kidney and may fall under the headings nephrosis, parenchymatous nephritis or glomerulonephritis. Clinically, they are marked by a prolonged albuminuria of high degree, with or without retention of nitrogen in the circulating blood. Hypertension is a secondary feature. Practically, these are examples of nephritis complicated by pregnancy.

The larger group of late toxemias includes the eclampsia, the preeclampsias and milder types which have been variously classified. In these, the patients do not have nitrogen retention, and albuminuria is not a prolonged feature, but occurs late and suddenly. Pathologically and clinically, in follow-up studies there is much to suggest that in their immediate and remote effects these are examples of vascular disease primarily and have much in common with the ordinary hypertensive cardiovascular disease of hyperpiesia. The loose use of the term nephritis in association with the late toxemias of pregnancy should no longer be countenanced. Recognition that the problem of these toxemias is bound up with that of cardiovascular disease with hypertension seems a helpful step in the search for their cause.

Diagnosis—Various kidney function tests have been employed in the differentiation of the toxemias of pregnancy. H. J. Stander, P. Ashton and J. F. Cadden (Am J Obst and Gynec 23:461 (Apr) 1932) report that of the Mosenthal, phenolsulphonphthalein, diastase, thiosulphate, urea concentration factor, urea clearance, guanidine and creatinine excretion tests, the latter 3 proved of real value in the differentiation between mild nephritis and the other toxemias of pregnancy. They recommend the *urea clearance* and *creatinine excretion tests* for routine use in all cases of toxemia of pregnancy in which the diagnosis is not clear. A urea clearance of below 80 per cent of the mean normal, and a creatinine excretion below 155 mg in the first hour, are strongly indicative of renal damage.

PROSTATE.—CHRONIC PROSTATITIS.—This has long been a subject of intense study and for the most part has always been considered as of specific origin.

Etiology—E. F. Etter (Urol and Cutan Rev 36:97 (Feb) 1932), writing on nonspecific prostatitis, considers that there is a close relationship between this condition and focal infection. He believes that this condition is more common than ordinarily diagnosed, that there is a definite relationship between it and focal infection. The majority of these cases can be classified as chronic. The treatment is as unsatisfactory as is that of specific prostatitis. Foci of infection must be removed, of course, and after their removal conservative treatment of the gland is indicated. Results can only be obtained if the urologist has the complete cooperation of the patient.

Treatment.—M. L. Boyd (J Urol 27:719 (June) 1932) feels that heat

is a valuable method in the treatment of prostatic infections. He uses **hot rectal irrigations** in patients with prostatitis and adds it as a method of treatment to the other appropriate nonsurgical measures and obtains definite results. He attributes the favorable results to the increased blood supply to the tissues and the improvement of the prostatic and seminal vesicular circulation. A two-way rectal tube, designed to prevent all irritation to the anus is used with a hot normal saline solution.

SCLEROSIS — Treatment.—It is interesting to note that E. L. Keyes (South M. J. 25 336 (Apr) 1932), in reviewing bladder neck sclerosis, feels that there is a sclerosis of the prostate distinct from that of bladder neck. He prefers **suprapubic resection with a rongeur**. This method is the one of choice where the Caulk or Young punch fails. The rongeur operation is more effective than transurethral procedures because it removes much more tissue than any of the latter except the transurethral electrocoagulation of Davis and McCarthy.

PROSTATECTOMY.—There will always be need for the open operation of prostatectomy by either the suprapubic or perineal route. The newer methods for attacking the prostate transurethrally, of course, are possible only when an instrument can be passed into the bladder without too much trauma. If the prostate is excessively large and vascular, it might be impossible also to use a resectoscope.

Technic—A. R. Thompson (Proc Roy Soc Med. 25 907 (Apr) 1932) describes simply and vividly the technic for suprapubic prostatectomy that has given the writer splendid results. He first teaches his patients thoracic respiration, uses, when possible, catheter drainage, and believes that atropine prior to operation may produce ileus. At

operation he fills the bladder with a mild antiseptic solution, packs off the prevesical spaces and opens the bladder transversely. Any bladder complication found is next handled and the prostate enucleated. He controls bleeding by sutures or pack and then drains the prostatic fossæ with a glass tube having an oblique flange. His use of sutures is unique. These are only placed in the fascia and skin, and the lower end of the skin is left open. The penis and scrotum are strapped high on the abdomen and dressings applied. He removes his drainage tube when the lavage becomes clear. Sloughing wounds are filled with boric acid crystals. He considers calculus disease of the bladder a bad complication, while diabetics have reacted well to surgery. Early removal of small prostatic adenomas is urged.

PROSTATIC RESECTION, REVISION, AND SO-CALLED TRANSURETHRAL PROSTATECTOMY.—No surgical procedure in the last few years has created the furore that this so-called new surgical attack upon vesical neck obstructions has called forth, whether due to inflammatory, malignant, or adenomatous enlargement of the prostate gland. The entire story of prostatic surgery is being rewritten. There are many arguments *pro* and *con* as to the efficiency and the applicability of resecting bladder neck obstructions no matter what the pathology.

The development of 2 instruments, one known as the **Stern-McCarthy electrotome** (J. F. McCarthy J. Urol 27 265 (Feb) 1932), and the other, the **Stern rectoscope**, in the hands of T. M. Davis (Urol and Cutan Rev 36 141 (Mar) 1932), and the development of an electrical current that will cut under water, has brought the treatment of prostatic obstructions of all types into the foreground. Davis uses the **Davis-Bovie electrosurgical unit** and McCarthy uses the **current developed by the complex oscillator**.

Technic—Most of the men who have taken up this work are followers of either the Davis or McCarthy technics. Davis uses trans-sacral block for his anesthesia. In bars and contracted vesical necks, sufficient parallel sections are made in the floor of the sphincter to completely remove the obstruction. In lateral lobes that encroach upon the posterior urethra, sections are made in a continuous line beginning at the vesical orifice, the succeeding section is made having the proximal edge of the preceding section in view at the distal edge of the fenestrum, remembering that 1 inch of tissue is removed with each section. Sufficient sections are made until a gutter is formed from the orifice to the level of the verumontanum high up in the lobe. This gutter is deepened by additional sections. The shelf of tissue below this gutter is removed until the obstruction in this lobe has disappeared. The opposite lobe is treated in a similar manner and any bar or median lobe is removed until the floor of the urethra is on or below the level of the trigone. When sufficient tissue is removed, the entire area is inspected and the most minute bleeding point is arrested by coagulation. The irrigating fluid should return perfectly clear before the instrument is removed. Continuous drainage for 48 hours is maintained with a 16 F soft rubber catheter to give the bladder complete rest, after which the catheter is removed and the patient voids a bold, free stream. Davis believes that with his present equipment it is possible to relieve more than 90 per cent of the cases with a simple operation, negligible risk, and end-results equal to, if not superior to, those obtained by prostatectomy.

Regardless of the type of obstruction or the operation to be performed, it is of paramount importance to properly prepare these patients by careful preoperative treatment.

The amount of tissue which he has removed has varied from $1\frac{1}{2}$ to 45 grams.

Only one recurrence was observed. His mortality following resection has been zero. The average stay in the hospital after operation has been 4 days. But 2 cases of postoperative hemorrhage were noted by Davis, 1 on the tenth and the other on the fourteenth day, both of which were easily controlled by coagulation per urethram.

He has had 1 accident, a rupture of the bladder through a diverticulum, due to coughing and straining, where it was necessary to do an immediate suprapubic cystotomy, with removal of the prostate, suprapubically, 10 days later.

Some postoperative infections have been encountered, but these have been of negligible frequency. Thirty-nine of the patients had carcinoma. The majority of his patients completely emptied their bladders immediately following operation. He concludes that prostatectomy, with its high mortality and morbidity, is contraindicated. He considers resection a minor operation as compared with prostatectomy and believes his results to be superior to those obtained by prostatectomy and, further, no type of prostate is a contraindication to this treatment.

In 2 articles by J. F. McCarthy (Am J Surg 15:435 (Mar) 1932) entitled "The Prostate at the Crossroad," and the other referred to above, the author discusses the development of the various methods of transurethral surgical attack upon the gland from the time of Bottini. In the development of his own technic McCarthy has taken into consideration all of the various work which preceded prostatic revision. He considers the ideal requirements for the operation as follows.

- 1 The most precise visualization of the prostatic urethra.

- 2 The greatest possible flexibility of manipulation under vision, of the electric cutting loop.

- 3 Ample electrical power to excise the obstructing prostate under water, with a coincidental minimum of hemorrhage and of tissue coagulation.

- 4 The interchangeability and ease of manipulation of electrodes in the closure of bleeding points.

- 5 The completion of the operation, including the introduction of a No. 24 F whistle-

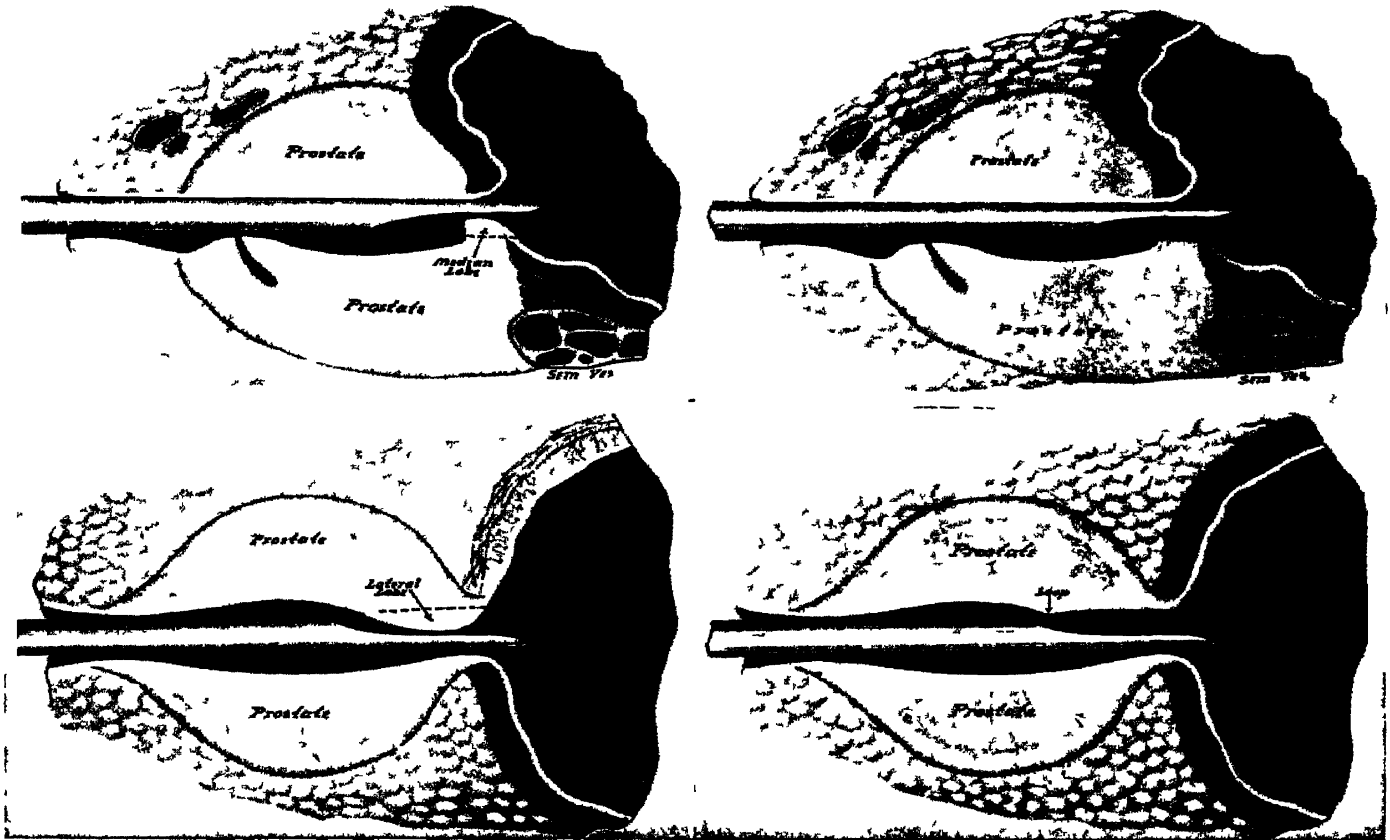
tipped indwelling catheter, with but 1 introduction of the instrument, the sheath being withdrawn after the catheter has passed through it

McCarthy considers the development by Frederick Wappler of the oscillator to be the one final step in making possible a successful prostatic revision. He emphasizes the fact that this is a

the treatment of the prostate at the crossroad

He emphasizes that the acid test of time is essential for this procedure to be given its proper value in the treatment of bladder neck obstructions

Bleeding points are visualized and coagulated under vision. As much tissue can be removed as desired. The experi-



Figs 1 to 4 (J F McCarthy Am J Surg)

highly technical procedure and should only be attempted by one qualified to handle a pan-endoscope. The brevity of hospital domicile, from 2 to 10 days, has decided economic advantages and the postoperative discomfort, as compared to that of suprapubic operation, is negligible. He considers that an early removal of certain portions of the prostate which show a tendency to hypertrophy will prevent later prostatic obstruction. In other words, he considers

ences of Caulk and Davis would indicate a relative permanency of the results. Occasionally it is necessary to repeat the procedure. The preliminary preparation is the same as for prostatectomy. The immediate postoperative care is thorough, frequent irrigation and constant maintenance of drainage. The indwelling catheter is removed as soon as the urine is clear.

Again, J F McCarthy (J Urol 27 265 (Feb) 1932) has employed this

method of surgical attack as *indicated* in the cases of simple fibrosis and in the complete retention of middle and lateral lobe hypertrophies and prostatic malignancies. It may not be indicated in very large intravesical or vascular prostates and should not be used in the so-called prefibrosis or subacute inflammatory prostates. Occasionally, it is necessary to resort to suprapubic *cystotomy* for the purpose of more adequate drainage. Warning is given to avoid damage to the verumontanum, beyond which point, cutting is absolutely interdicted.

Thorough familiarity with the use of the pan-endoscope and a precise knowledge of deep urethral pathology are emphasized as essential prerequisites.

PRURITUS.—TREATMENT.—

J Sauer (Deutsches Arch f Klin M 172 219 (Dec 21) 1931) employed potassium therapy in sympathetic pruritus. Patients with chronic lichen urticatus, in whom ointments and irradiation had proved ineffective, were given 3 times daily a tablespoonful of *liquor potassii acetici*, 30 cc (1 ounce), and *aqua destillata*, sufficient to make 200 cc ($6\frac{3}{5}$ ounces). After 2 days the pruritus had disappeared. Of 9 cases treated, only 2 were refractory to the potassium therapy. Several cases of chronic eczema of the hands likewise yielded to potassium therapy.

PSORIASIS.—PATHOGENESIS.—J C Torrey and H J Schwartz (Arch Dermat and Syph 26: 27 (July) 1932) give a report on intestinal flora in 30 cases of psoriasis and on blood cultures in 16 cases.

The observations indicate that the types of bacteria vegetating in the intestine in such cases, as revealed by exami-

nation of the stools, do not differ essentially either qualitatively or quantitatively from what might be encountered in a similar series of nonpsoriatic persons who are not sufferers from gastrointestinal disabilities. There was no evidence that any unusual bacterial toxin of a soluble nature or toxic product from bacterial decomposition is formed in the intestinal tracts of sufferers from psoriasis.

These examinations did not reveal unusual numbers or types of yeast-like fungi in the stools. Monilia occurred rather irregularly and always in small numbers.

Blood cultures were negative in 11 of 16 cases. In the 5 cases giving positive cultures, bacteria apparently of intestinal or buccal origin were isolated and were evidently casual invaders of the blood stream. There was no evidence of sensitization of an allergic nature to the test bacteria in their cases of psoriasis.

TREATMENT — D A Elkin (Sovet vrach gaz (Feb 15) 1932) reports on the treatment of psoriasis in the light of protein therapy, in which keratin and the toxic cellular proteins lead to desensitization of the skin and at the same time stimulate the organism to the development of antibodies. Eight patients from 15 to 45 years of age were subjects for the study. From 1 to 2 cc of a 1 per cent solution of the scales from psoriasis lesions were injected daily or every other day. The injections were given intramuscularly. Following his observations in these cases, the author concludes that treatment, consisting of injections of solution of scales from psoriatic lesions in 96 per cent alcohol, has a therapeutic effect in some cases but cannot be recommended for general practice.

PSYCHIATRY.—Seven cases of brain tumor are reported by L J Adelstein and M G Carter (*Am J Psychiat* 12 317 (Sept) 1932), which were associated with marked psychosis at the outset. They draw the following conclusions:

1 The incidence of brain tumor as a clinical entity is about 1 per cent

2 Psychosis *per se* may be the first presenting symptom in tumor of the brain

3 All cases presenting a psychosis should receive a thorough neurologic examination to rule out a possible basis in the nature of an intracranial neoplasm

4 Visual hallucinations are of localizing value only if distinct and apart from a psychosis

5 Auditory hallucinations are of localizing value if separate and distinctly apart from a psychosis

6 Mental phenomena associated with brain tumor may be regarded as focal in nature only if the neurologic examination will bear out the localization

7 In the series of cases presented, the most marked mental changes were noted in those involving the frontal lobes and the corpus callosum

8 The various attitudes of the profession toward the brain tumor problem, particularly when it is complicated by the presence of a psychosis, is well summed up in the apt remarks of Holmes, who said that "divergence of opinion arose from the fact that the psychiatrist rarely found evidence of intracranial neoplasm in his patients, but the neurologist knew that a relatively large proportion of patients with increased intracranial pressure presented some abnormalities of mind"

CRIME AND ENDOCRINE GLANDS.—Louis Berman (*Am. J. Psychiat* 12 215 (Sept) 1932), after

an extensive study, draws the following conclusions.

1 Crime is due, in a Gestalt sense, to a perversion of the instinctive drives dependent upon a deficiency and imbalance of the endocrine glands

2 Certain types of crimes are associated with certain types of endocrine malfunctioning

3. Most criminals are derived from juvenile delinquents and most juvenile delinquents tend to become criminals

4 Endocrine imbalance and deficiency have been found to occur in about the same frequency and of about the same type in juvenile delinquents as in criminals

5 Endocrine treatment of the specific endocrine condition in juvenile delinquents has resulted in a correction of the delinquent behavior.

6 Juvenile delinquency and its sequel, crime, can be prevented by proper attention to the status of the different endocrines which contribute to the development of the normal social personality during childhood and adolescence

7 All concepts of justice, punishment and crime must be revised and reconstructed in the light of these findings

J Notkin (*Ibid* 12 331, 1932), on the other hand, concludes that endocrinopathies are rarely associated with psychoses and cannot be regarded as etiologic factors

INVOLUTION PSYCHOSES.—G R Jameison and J. H Wall (*Ibid* 11 895 (Mar) 1932) conclude that involution psychosis is not a complete entity in itself. The life history of the patient, including family tendencies, physical constitution, personality and psychic forces all have an influence. The period of the menopause with its physiological changes forms the background for the play of these several

factors Any type of borderline or frank mental disease may appear at this time G H Stevenson and S R Montgomery (*Ibid* 11 911) (Mar) 1932) describe a special clinical subentity in the psychogenic or "reaction to environment" group of psychoses, in which the chief symptoms are persecutory delusions, with or without hallucination, and without obvious personality or intellectual changes, occurring in highly moral women, and becoming apparent during the fifth and sixth decades after a long prodromal period, the change from normal to psychopathic being so gradual that relatives have found difficulty in fixing the date of onset and persons who have but slight contact with the patient are not aware that the individual is suffering from a psychosis A close study of many cases over a period of years has convinced these authors that there is a specific etiological factor, among others common to the group as a whole This so-called specific factor is held to be an overt or imagined sinful act on the part of the patient, which is not sinful to the patient, however, as she either projects the blame on others or denies that it would have been consciously desired by her The situation is thus not dealt with adequately and honestly, and a state of emotional unrest is produced As a quietus to conscience, a persecutory delusional trend is developed slowly and progressively, until a well-marked psychosis results

Treatment. — K M Bowman and Laurretta Bender (*Ibid* 11.867 (Mar) 1932) treated 7 cases of involution psychosis with ovarian hormone in the form of amniotin Two cases showed a good social recovery, 3 were unimproved, 2 cases died of anemia and malignancy The authors advise the use of organotherapy, feeling that the

specific glandular therapy is at least useful as a palliative measure

The psychoses and psychoneuroses in the involutional period of man is discussed by E Jacobi (*Arch f Psychiat* 93 358, 1931) with the following conclusions

1 During the involutional period (from 40 to 60) there seems to be an increased tendency toward mental disease In men one must discount mental diseases due to syphilis, alcohol and other organic causes, which form a high proportion of the psychoses at this age Even after discounting these factors, however, there is a definite increase in the incidence of mental diseases at this age, although it is not so marked in men as in women

2 The question of how much climacteric factors are responsible for the development of these diseases is preceded by more fundamental question as to whether there is a climacterium in men This question is answered in the negative, *i e*, there is no sharply outlined climacteric period in men as there is in women The author agrees with Hoche in the opinion that the climacterium in men is really represented by a gradual, at times almost imperceptible, change which, later, blends with the involution and senile changes of the rest of the body Consequently, the influence, if any, is indefinite

3 The psychoses occurring most frequently at this stage of life are depressions The next in frequency are paranoid states with more or less marked depressive colorings Next to these in frequency are the so-called psychogenic mental disturbances, clearly related to some mental and physical incident of a depressing nature They resemble most closely the psychoneuroses and are frequently connected with insurance and

pension claims The least frequent of all are the schizophrenia-like diseases, and the author especially stresses the point that, unlike women, men do not show the so-called "late catatonias"

4 All the mental disturbances, no matter what their type, show certain characteristically involutinal peculiarities The most important of these are anxiety states, hypochondriac complaints, depression and agitation The increase in psychomotor activity, although present in a great number of cases, is not so frequent as in women The prognosis is poor, and feelings of hopelessness and inadequacy accompany practically all of these conditions

5 The intimate relationship that exists between the sexual life of the patient and the occurrence of these disturbances is not as evident in men as in women There may be a lessened sexual activity with the psychosis, but it is most usually the resultant of the psychosis, especially of depression, rather than the cause Similarly, there does not seem to be such a marked relationship between the prepsychotic personality and the symptoms as there is in women The hereditary influence is marked

The combined use of induced narcosis and fever therapy is discussed by A W Hackfield (Arch Neurol Psychiat 28 1169 (Nov) 1932), who subjected 10 psychotic patients suffering from the "affective syndrome" by giving each night 3 to 6 grains (0.2 to 0.4 Gm) of phenobarbital sodium and the following afternoon gradually increased doses of typhoid vaccine. This was continued for 5 days when the vaccine was discontinued and a prolonged narcosis begun Hackfield reports favorable results in 6 out of the 10 cases He does not attempt to give

a satisfactory explanation for the results obtained

PYELITIS. — TREATMENT. —

In discussing the treatment of pyelitis, R L Anderson (Pennsylvania M. J. 35 630 (June) 1932) states plainly that the diagnosis should be pyelonephritis He offers rest in bed, free diuresis, and ureteral and pelvic lavage. If improvement is delayed, he uses the indwelling catheter while he is diligently searching for and eliminating foci of infection In *obstructive ureteral lesions* he emphasizes general gradual dilatation of the ureters and he considers hexylresorcinol and hexamine in an acid medium to be valuable drugs in this condition

PYELITIS IN CHILDREN. —

DEFINITION.—According to R E Van Duzen (Dallas M. J. 17:93, 1931), the term "pyelitis," is generally considered to include not only the true infections of the renal pelvis, but also any infection in the urinary tract and pus in the voided urine, except in female infants with vaginitis R L J Kennedy (J Urol 27 371 (Apr) 1932) states that the condition usually termed "pyelitis" is an infection of the urinary tract; it is not known if this condition, either at its inception or later, is an inflammation of the renal pelvis

ETIOLOGY.—(a) *Predisposing Causes.*—*Sex*—In a group of 72 infants with pyelitis, who ranged in age from 1 month to 2 years, S V Rodkin and D D Kaganova (Vrach. dilo 14 1179 (Nov 30); 1279 (Dec 31) 1931) found that 73.5 per cent of the cases occurred more frequently in female infants H R Litchfield and J H Gillman (Arch Pediat 49 776, 1932) state that *neonatal pyelitis* is probably a

periodic disease which occurs more frequently in male infants

Influenza—Thirty-four of the patients with pyelitis observed by Rodkin and Kaganova occurred with attacks of influenza

Nutritional Deficiencies—Twenty-four of the cases of Rodkin and Kaganova were associated with severe, nutritional deficiencies

Erysicosis—C C Stewart (Am J Dis Child 43 632 (Mar) 1932) produced pyelitis in 14 of 45 rabbits by infusions of 20 per cent solution of sucrose. Repeated injections and longer survival of the animals increased the incidence of urinary infections. The mechanism by which the lowered resistance of the kidney to infection is brought about is not known

The effect of decreased intake of water was studied in rats, guinea-pigs and dogs. In spite of rigorous restrictions of fluids, pyuria was observed only once in a guinea-pig without bacilluria. There was no histologic evidence of inflammation of the urinary tract in any of the animals. From these observations, the author states that it seems improbable that withdrawal of water from the tissue alone was the responsible factor for the pyelitis produced in the rabbit

Urinary tract obstruction may also be a predisposing cause of pyelitis (A V Neale Arch Dis Childhood 7 97 (Apr) 1932)

(b) *Specific Cause*.—The bacilli of the colon group, according to R Kennedy (*loc cit*) are nearly always responsible for pyelitis

PATHOLOGY.—R Kennedy (*loc cit*) made a histologic study of the kidneys of 4 children who died of pyelitis in from 10 days to 3 weeks after the onset of the disease. In 1 case there was

evidence that 1 kidney was not affected until 3 days before death

The earliest changes observed consisted of phenomena of acute inflammation. There was edema and congestion, and leukocytic infiltration of the intertubular tissue, of the peripelvic areolar tissue, and of the pelvic epithelium. At the time of examination the process had become diffuse and no conclusions could be drawn as to the original site of involvement. The infiltration rapidly proceeded to formation of abscesses, so that massive collections of leukocytes could be found throughout the kidney and renal pelvis. The glomeruli seemed to be peculiarly resistant to infection

Healing of the affected portions began shortly after the injury. The essential features of the healing lesion were diminution in the number of leukocytes, relative increase in the number of lymphocytes, marked phagocytosis, the appearance of polyblastic cells, and the formation of connective tissue replacing the products of acute inflammation. The late stage of healing was represented by rather dense collections of lymphocytes in regions of connective tissues. Although not observed in these cases, the pits or scars found in the surface of kidneys of older persons are the results of such processes

Practically all the changes described could be found side by side, in a single kidney

R Kennedy also studied experimental renal lesions produced by 3 routes of infection, *i e*, by the hematogenous route, with and without ureteral obstruction, and by the ascending route, with obstruction

The site of the early lesions in hematogenous infection is the renal parenchyma, usually in the region of the convoluted tubules or in the central por-

tion of the papilla. The early cortical and medullary lesions which follow infection after intravenous injection are abscesses, or regions of cellulitis which rapidly increase in size. In the presence of obstruction, the first lesions produced by intravenous injection of organisms are found in the cortex. The primary peripelvic lesion in obstructed kidneys infected by the hematogenous route extends from the peripelvic tissue a short distance into the parenchyma. A few resulting cortical abscesses enlarge and extend toward the pelvis.

In ascending infection, the primary lesion is in the pelvic lining and the peripelvic tissues and has been traced from the bladder through the ureter as well as through the periureteral lymphatic channels to the pelvis.

In all these experimental types of infection there can be rapid involvement of the entire kidney in a suppurative process. Evidence of healing is found within 48 hours, and begins in the cortical and medullary lesions. The process of healing in the peripelvic tissues begins somewhat later. In neither cortex nor peripelvic tissue does the process of healing manifest itself simultaneously in every lesion.

ROUTE OF INVASION.—According to previous experiments, H. F. Helmholz (Proc. Staff Meet., Mayo Clin. 7: 174 (Mar. 23) 1932) states that bacilluria by intravenous injections of colon bacilli into animals does not persist in the bladder after the bacilli disappear from the upper urinary tract. Spontaneous bacilluria involving the upper part of the urinary tract is exceptional. Since the bacilli do not reach the bladder through the ureter, it seems probable that they enter the bladder through the urethra or by direct extension from the rectum in the male.

Of the 67 cases of spontaneous infection in animals, the pelvic bacilluria was bilateral in 3 cases and unilateral in 1. Helmholz interprets this as representing the first stage in the ascent of the infection, since there was bacterial contamination of the pelvic urine without inflammation of the pelvic lining. Finally, there were 16 cases of infection of the upper part of the urinary tract, of which 11 were cases of simple pyelitis, in which the pelvis alone was the seat of infection. This represents the second stage in the ascent of infection, in which there is inflammation of the pelvic mucosa.

The deductions strongly suggested by the pathologic changes observed in the 67 cases of pyelitis and by their distribution frequency, received strong support by comparison with a series of lesions produced experimentally in 46 rabbits by injection of colon bacilli into the blood stream or the bladder. Of the 46 cases, the kidneys of 20 animals with hematogenous infection and of 13 with ascending infections were studied and lesions diagrammed. On the basis of their work it appears that the probable mode of infection often can be determined without difficulty. It seems fair to state, according to the author, that in the rabbit the infections of the urinary tract with colon-like organisms start in the bladder and ascend to the pelvis and the renal parenchyma. As far as the child is concerned, the author states, up to the present time, no study of material obtained at operation or necropsy has furnished a histologic picture of the early stages of colon bacillus infection of the urinary tract. It is necessary to supply this lack of information by observation of animals in which the various stages of spontaneous lesions can be compared with lesions produced at will.

Such comparisons suggest strongly the existence of pyelitis, that is an infection limited to the pelvis of the kidney and that it had its origin in ascending infection from the bladder

DIAGNOSIS.—A Neale (*loc cit*) considers that chronic urinary sepsis as a sign of disease in the urinary tract requires careful and extended investigation P Goldfader (*Arch Pediat* 49 417 (July) 1932) states that surgical affections of the urinary tract in children and young adults are not as uncommon as was formerly believed Furthermore, the author points out, in the great majority of cases in children, the modern urologic diagnostic procedures employed in adults, namely cystoscopy, catheterization of ureters, kidney functional tests, ureteropyelography, cystography, intravenous injection of skiodan, can be safely employed

PROGNOSIS.—According to Rodkin and Kaganova (*loc cit*), there was often a discrepancy between the height of the fever and the severity of illness The *leukocyte count* did not seem to be of either prognostic or diagnostic value However, duration of the blood picture to the left was most marked in disturbances with a bad prognosis The mortality rate was 22 per cent, most of the deaths occurring in the *first 6 months* of life

TREATMENT.—Rodkin and Kaganova state that the only rational course in *prophylaxis* and *treatment* is to be aimed against chronic and acute disturbances in nutrition

PYORRHEA ALVEOLARIS.—Pyorrhea is a disease affecting the periodontal membrane, gingiva and the alveolar process. It is characterized by a slow progressive destruction of the tooth sockets, starting in or about the

junction of the periodontal membrane and the gingival tissues There is a gradual removal of the attachment of the teeth to the jaw, the loss of the supporting alveolar bone, and a final extrusion of the teeth The disease is usually associated with a discharge of pus from the tooth sockets The disease usually progresses very slowly

Pyorrhea may be strictly a localized condition limited to a group of teeth or to one tooth Then, again, it may be generalized, affecting the whole of the gum and alveolar margins of the jaws Such cases occur often in acute infectious fevers, or when there is a general underlying weakness, a predisposition of the gingival tissues Faulty habits in general hygiene, defective elimination, unbalanced diet, inadequate intake of fluids are all factors which have a definite bearing on the incidence of the disease and upon its control and cure

DIETETIC TREATMENT.—The successful control of dental caries and systemic pyorrhea by the manipulation of diet based on biochemical tests opens up a new field The major factors in dental caries and systemic pyorrhea are faulty acid-base balance and calcium-phosphorus balance, according to H F Hawkins (*J Am Dent A* 19 963 (June) 1932)

In systemic pyorrhea, the manipulation of foods would be as follows:

- 1 The vegetables, potatoes, and fruits should be greatly increased to reduce the acidosis

- 2 Meat, fish, eggs, American cheese and vitamin D should be greatly reduced It is practically impossible to control pyorrhea if these items are in great excess

- 3 Butter, cream, fats and oils have a very helpful effect on salivary pH

The increase in alkalinity improves the tone of the mucous membrane

4 Cereals are not indicated and should be kept very low

5 Milk should be freely given in all cases of pyorrhea, as calcium has been shown to be low as compared to phosphorus in all cases of pyorrhea

PYRIDIUM.—PHYSIOLOGICAL ACTION.—The use of pyridium as a urinary antiseptic has been studied by P J Riaboff (J Urol 27 329 (Mar) 1932) with special reference to

its elimination by the kidney. He concludes that it is eliminated by high concentration by the kidney

This elimination is considerably lower when the preparation is administered to bed patients. It is not toxic and not irritating to the genitourinary tract. In large doses it is not destructive nor does it cause degenerative processes in the tissues. It has no bactericidal or bacteriostatic effects on *Bacillus coli* or *Staphylococcus aureus in vitro*, and it does not fulfill the standards as an urinary antiseptic

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QUININE.—UNTOWARD EFFECTS.—In discussing *idiosyncrasy* to quinine, E Manoussakis (Paris méd 1 98 (Jan 30) 1932) asserts that the best known morbid manifestations following absorption of quinine are the *scarlatiniform exanthems* or a rash with or without pseudoasthmatic or anginal phenomena. The symptoms which differentiate this crisis from true scarlet fever are the absence of an incubation period, absence of exanthem, tachycardia, high fever, and vomiting. The urticaria due to quinine is common and easy to diagnose. The rash comes quickly and the disturbance is chiefly gastrointestinal or respiratory. The *prognosis* is good unless the crisis is accompanied by an intense inflammatory phenomenon, either in the external or the internal organs, in which case it is dramatic. These grave crises follow the absorption of large doses of quinine by sensitive and weakened individuals. Another form of idiosyncrasy is *hemoglobinuria*.

The tolerance dose of quinine varies in all sensitive individuals (from sev-

eral tenths of a milligram to 1 Gm — 15 grains). The dose is usually weaker for the patients who react by an urticarian crisis or scarlatinal exanthem with or without internal inflammatory phenomenon than for those who react by hemoglobinuria. The sensitivity to quinine is due to a congenital predisposition; it is sometimes familial, but not hereditary. In discussing treatment, the author believes that individuals sensitive to quinine should avoid malarial countries. The appearance of these accidents is due to the presence of appreciable quantities of quinine in the circulation. To avoid these accidents, a dose of quinine should be administered when the preceding dose already absorbed has been eliminated. The author usually begins by the injection of 0.1 Gm (1½ grains) of quinine, and if at the end of 1 hour there is no reaction, this is followed by the injection of 0.25 Gm (4 grains), the dose which in most instances determines sensitivity. If the reaction is slight, the injection is repeated in the evening, but if the reaction does not disappear, the second injection

is postponed until the following day. The second injection usually determines the degree of sensitivity. Slight reactions may be observed after the next 2 injections of 0.25 Gm (4 grains) each, 1 at noon and 1 in the evening, but the following injections will be tolerated without the least subjective or objective inconvenience.

THERAPY.—According to observations made by I. Bram (Northwest Med 30:308 (July) 1931), patients with active hyperthyroidism are capable of taking from 30 to 90 grains (2 to 6 Gm) of quinine sulphate daily for weeks without evidence of cinchonism, whereas persons in whom thyroid function is normal or deficient usually develop symptoms of cinchonism after the administration of 20 to 30 grains (1.3 to 2 Gm) of quinine. As the result of observations in a total of 800 cases of hyperthyroidism, the author concluded that the quinine test for thyrotoxicosis is a dependable guide in diagnosis, the frequency of error not exceeding 5 per cent. As with basal metabolic studies, the test does not discriminate between toxic adenoma and exophthalmic goiter. The tolerance for quinine by subjects of hyperthyroidism appears to vary in direct proportion with the height of the basal metabolic rate, and is fairly parallel with it, thus serving as a guide in the progress of the disease. Maximal doses of quinine sulphate given cases of hyperthyroidism have proved to be of distinct benefit in over 60 per cent of the author's series and may be regarded, in his opinion, as a valuable asset in the treatment of these patients. From the evidence at hand, the author states that it would appear that the physiologic action of quinine favors either a curbing of excessive thyroid output, or a neutralization of excessive thyroxin in

the blood, or both. Whatever the explanation may be, he considers it a fairly safe assumption that, while quinine is not the mainstay in treatment, it is a very useful adjuvant to the therapeutics of these patients, irrespective of whether the treatment is basically surgical, x-ray or medical.

J. P. Sanders (J. A. M. A. 97:850 (Sept. 19) 1931) reports the successful use of *quinidine sulphate* in the treatment of a series of 39 patients with malaria. The use of quinidine in these cases was prompted after the author had obtained excellent results with it in the treatment of a patient with benign tertian malaria who was unable to tolerate quinine because of a pronounced acquired anaphylactoid reaction to it. In this case a positive skin sensitization test was obtained to quinine but not to its dextrorotatory isomer, quinidine.

Quinidine was administered to the patients of this series for 4 successive days, each dose being given from 2 to 4 hours before the hour at which the paroxysms had been occurring. The daily dose was 10 grains (0.65 Gm). In each of the 39 patients, the immediate results of even this short treatment were prompt cessation of paroxysms and, in the majority of the cases in which blood smears could be secured, at least temporary disappearance of asexual parasites from the blood. In view of these results, the author feels that quinidine may well be given a trial in the treatment of malaria in cases of quinine intolerance.

H. A. Reimann and J. K. Moen (Arch. Int. Med. 50:276 (Aug.) 1932) are of the opinion that clinical reports concerning the beneficial effects of quinine hydrochloride and of ethylhydrocupreine hydrochloride in the treatment of pneumonia are, for the most part,

unconvincing, since conclusions in regard to the efficacy of the drug are based chiefly on clinical and bedside impressions, which criteria are, as a rule, too unreliable for use as scientific data. These investigators believe that convincing evidence can be obtained only from careful studies showing a shortening of the duration of the disease, a diminution or elimination of bacteriemia and a reduction of the mortality, such as have been demonstrated in the use of specific serum. Furthermore, it is impossible, in their opinion, to evaluate the results of most studies of patients treated with quinine derivatives, since in practically none have attempts been made to classify pneumonia on an etiologic basis in regard to type of pneumococcus.

A series of controlled experiments on rabbits was, therefore, carried out by the authors to retest the effects of quinine on controlled pneumococcus infection and to compare its effects with those of specific immune serum. For this purpose, the new satisfactory intradermal method of inducing pneumococcus infection, developed by Goodner, was employed, this method affording,

under experimental conditions, a symptom complex that is analogous in several respects to lobar pneumonia in man. The method also made it possible to observe and to compare the effects of various methods of treatment.

In conclusion, the authors state that the results of the experiments leave no doubt as to the superiority of specific immune serum over the employment of quinine therapy in the treatment of pneumococcus infection in rabbits. Quinine hydrochloride and ethylhydrocupreine hydrochloride, although pneumococcicidal *in vitro*, appear to have no effect on the course of the infection, on the bacteriemia, or on the outcome as compared with the controls. Of the 22 rabbits treated with quinine derivatives, all died and all of the 17 untreated animals died in approximately the same length of time after inoculation with Type I pneumococci. On the other hand, 5 of 8 animals treated with specific immune serum recovered. The quinine salts had no influence either on the milder infections due to Type II pneumococci. Treated and controlled animals recovered in approximately the same length of time.

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RADIUM AND X-RAYS.— RADIUM.—INTRODUCTION.—

References to radium in current medical literature become more and more numerous, and, since they frequently contain technical terms with which the general medical man is necessarily unfamiliar, it has been deemed advisable to introduce a brief description of the fundamental processes of radium therapy, together with explanations of the technical expressions employed.

Radium is used in modern medicine as a therapeutic agent in 2 forms: (1) as "*element*" and (2) as "*emanation*," also known as "*radon*." The first is a *salt* (or double salt) of the metal, such as *radium bromide* or *radium barium sulphate*, the second is a *gas* derived from a *radium salt in solution*. The therapeutic actions of these two forms may be regarded as identical, and are the result of bombardment of the tissue cells by the rays that are emitted.

These rays (subdivided into "beta" and "gamma" on the basis of differences in wave length) exercise a deleterious influence upon all living matter, the effect varying from mild irritation to actual necrosis. The quantity of radium "element" employed is usually expressed in milligrams; the quantity of "emanation" (radon) in millicuries. One milligram equals one millicurie. *Dosage* is expressed in milligram-hours or millicurie hours—the product obtained by multiplying the quantity by the number of hours during which it is applied.

Radium "*element*" is generally placed in tubes, needles or plaques. A *tube* is a short cylindrical container suitable for introduction into one of the natural cavities of the body or for application on the surface. Tubes contain from 15 to 50 mg. *Needles* carry 3 to 12.5 mg. They have an eye to which a retaining thread can be attached and a point to facilitate thrusting them directly into the depths of the tissue it is desired to radiate. *Plaques* are flat applicators containing a small amount of radium; they are used in the treatment of skin conditions. Emanation, or radon, is commonly pumped into short capillary tubes of glass or gold. These containers are very small and are admirably fitted for permanent implantation into and around malignant tumors, hence they are referred to as "*seeds*" or "*implants*."

By *filter*, is meant a material interposed between the source of radiation and the tissues to be affected. The material is usually metallic, gold, platinum, brass, silver or lead being commonly employed. The object of the filter is to eliminate the rays of longer wave length, which, except in cutaneous therapy, are usually undesirable.

A "*pack*" is a large quantity of radium applied externally and, as a rule, at some

distance from the skin. Packs contain from 200 mg to 4 Gm of heavily filtered radium. The larger ones are sometimes termed "*bombs*."

The mechanism operative in producing the biological effects of radium is obscure. Histological studies of irradiated tissue reveal unmistakable evidence of destructive action.

The *law of Bergome and Tribondeau* states that cells when dividing are more susceptible to radiation than when resting, and upon this law rests in large measure the structure of modern radiotherapeutics. As a matter of fact, the response of any type of tissue can be predicted with considerable accuracy by a study of its histology and a consideration of the normal or abnormal life cycles of its constituent cells.

It is well known that the "adult and highly differentiated" pyramidal cells of the cerebral cortex are extremely resistant to radiation, while the "young and undifferentiated" ones of rapidly growing sarcoma are highly sensitive. The classical work of Regaud in the Radium Institute of the University of Paris illustrates the efficacy of prolonged and relatively mild radium dosage in controlling the growth of malignant cells. In a general way it may be said that the objective in radiotherapy of cancer is two-fold: (1) to restrain or destroy the tumor cells, and (2) to preserve the anatomy and physiology of the surrounding normal tissue, and that the selective action of radium in accomplishing this depends upon the relative susceptibility of the nuclei of benign and malignant cells, especially when undergoing mitosis. The direct lethal action of radium is frequently employed in treating epitheliomas of the skin. Here the caustic effects of the beta rays are utilized by reducing the interposed filtra-

tion to a low value and delivering a sufficient dose to kill all superficial cells subjacent to the applicator.

In this form of therapy the results are similar to those obtained by chemical or thermal cauterization, but in the hands of competent workers prove to be definitely superior, allowing less likelihood of recurrence and producing a better cosmetic result, which is of considerable importance, as the majority of these lesions occur on the face

In concluding these prefatory remarks, it is of interest to note that a very high percentage of all radium treatments can be carried out with a supply of 100 mg. of element properly distributed, and that in an internationally known clinic with one of the largest stocks of radium in the world at its disposal, only 66 mg are employed per patient when treating the average case of carcinoma of the cervix. Nevertheless, it is imperative, if good work is to be done, that the surgeon be thoroughly grounded in the biophysics of radiation and be well aware of the limitations, risks and contraindications of radium therapy

THERAPEUTIC USES.—Actinomycosis.—F. A. Figi and R. E. Cutts (Am J Dis Child 42 270 (Aug) 1931) report 14 cases of actinomycosis from The Mayo Clinic occurring in children from 2 to 15 years of age. This series represents less than 3 per cent of the 450 patients examined who were suffering from this disease. The cervicofacial area was involved in 10 of the cases, the abdomen in 4. The history, symptoms, physical findings, diagnosis and treatment were essentially the same in these children as in adults, but with one exception, *viz*, that a record of preceding trauma was not obtainable. The treatment comprised increasing doses of

a saturated solution of *potassium iodide* internally and the *local* application of *screened radium* at intervals of 3 to 6 weeks, the total number of irradiations varying from 1 to 5. Continuous *hot wet compresses* were also applied to the involved areas with *free drainage* after suppuration. Figi and Cutts report 8 of the 10 children with the disease in the head and neck alive and well. Of the 4 with abdominal lesions, 3 died.

Breast, Carcinoma of the.—In reporting his experiences with *radium* therapy of carcinoma of the breast, with or without surgery, in 171 cases, G. Keynes (Brit. J. Surg 19 415 (Jan.) 1932) considers that the following questions may rightfully be propounded in regard to the use of radium in treating this form of cancer: is radium capable of eradicating the primary breast tumor? Will metastasis to lymphatic glands disappear under radium therapy? Will radium effect a cure or prove of definite palliative value in cases that are inoperable? How do the results obtained in inoperable cases by radium alone, or by radium plus surgery, compare with those obtained with surgery alone? When utilizing radium in the treatment of cancer of the breast, 2 methods are available. (1) external irradiation and (2) interstitial implantation. The former requires a large quantity of radium, the latter, a relatively small amount. Keynes employs interstitial needles and directs his attack upon 2 main areas—the breast with its primary growth and the accessible lymphatic drainage areas. The needles contain 3 mg distributed over an active length of 4.8 cm. They are introduced into the tissues 0.5 cm apart, preferably in the plane of the pectoral fascia when attacking the breast and deeper than the growth itself. Thus, skin necrosis and

local sloughing of the tumor are avoided and the main lymphatic channels are subjected to intensive radiation as well as the overlying neoplasm in the breast itself. Additional needles are placed along the border of the pectoralis major to the axilla, and also in positions to irradiate the axillary, supraclavicular and infraclavicular glands. A needle is also implanted in each of the first 4 intercostal spaces. These needles are allowed to remain *in situ* for 7 days. Reduction in size of the tumor should be apparent in 2 weeks after the needles have been withdrawn from the tissues and further treatment should then be deferred for several months, as this shrinkage may continue over quite a period of time.

Radium therapy of the breast may also be employed after local surgical excision, preceding simple mastectomy, and, prophylactically, following radical operation. Keynes feels that radium is the agent of choice when dealing with advanced inoperable malignancy of the breast and that in cases of early tumor it should displace radical surgery or perhaps be combined with a very conservative operation.

The present status of radium therapy in carcinoma of the breast is discussed by O. N. Meland (Am J Roentgenol. 28:223 (Aug.) 1932), who gives his experiences with the method employed in the Soiland Clinic at Los Angeles. He endeavors to obtain a "radium Halsted" by implanting his needles around the tumor, in the axilla; in the subpectoral area; in the posterior axillary line; in the costocoracoid region; in the supraclavicular space, and in the internal mammary region. General anesthesia with gas and oxygen or local anesthesia with 1 per cent *novocaine* (preceded by *morphine* and *hyoscine*)

may be employed, preferably the latter. The radium needles are plunged through cutaneous stab wounds at intervals of 1.5 to 2 cm. All have a filtration of 0.5 mm of platinum, contain on the average 2 mg of element, vary in length from 2.8 cm to 4.4 cm and remain *in situ* for 7 to 10 days. The expected reactions are local edema of the breast and surrounding tissues, commencing about the fourth day, and a pronounced erythema of the skin in the axilla and over the tumor first appearing in 2 weeks. This is followed by desquamation and moderate pigmentation. Considerable soreness may be experienced during the early part of the treatment, the temperature may rise to 100° F (37.8° C) and the patient may be nauseated. Blood counts show little change in hemoglobin and erythrocytes, but the white cells fall 1500 to 2000. No complications of a serious nature have arisen. Meland enumerates the advantages and disadvantages of this treatment as follows:

Advantages

(a) Simplicity of execution. If anatomical factors are borne in mind so that accidental injury is avoided, it appears that this method of attacking carcinoma is ideal, since there is no shock in carrying out the operative procedure.

(b) It can be used in inoperable cases. The inoperability consists only in advancement to the supraclavicular area. If there is bony involvement it is obvious that this treatment which, like surgery, is purely local, will have no effect on distant metastasis.

(c) Ability to influence the supraclavicular and mammary group of lymph nodes. Although these may be removed surgically, the chances of success are poor, while the shock of the prolonged operation is very great.

(d) No mutilation of the normal structures, consequently no interference with function

(e) Ability to repeat the treatment if necessary, and, if need be, a small residual lesion may be removed from the breast itself

(c) The residual discomfort, which consists of a dull aching pain described as neuritis. Whether this is worse than the edema and discomfort seen following removal of the muscles and fascia after the radical operation remains to be seen

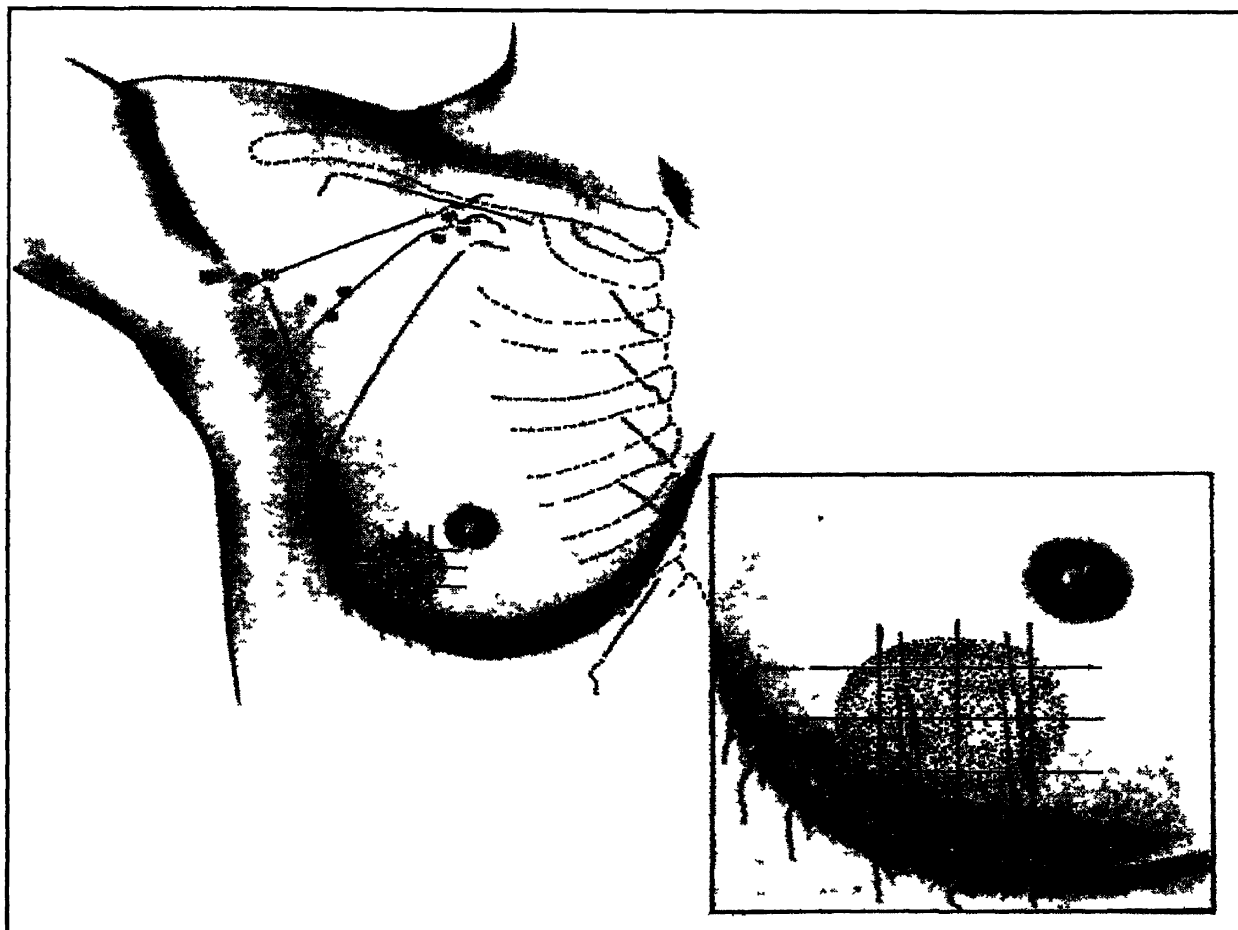


Fig 1—Distribution of gold radon transfexion tubes in breast, axilla, and paramammary regions (G T Pack Am J Roentgenol, Apr, 1932)

Disadvantages

(a) There is no way of knowing whether carcinoma is being dealt with unless a biopsy is performed. This is necessary for statistical purposes, but clinically, most advanced cases can be diagnosed correctly

(b) There is no way of knowing whether the irradiation has reached all structures that may be the seat of malignant extension. This same disadvantage is applicable to surgery.

(d) Occasionally, it is necessary to repeat the treatment. Recurrence is frequent after operation so that this is not a valid excuse

B J Lee (*Ibid.* 27 547 (Apr) 1932) describes his *radium* treatment of cancer of the breast at the Memorial Hospital in New York. This comprehensive report should be read in the original but Lee's summary is here presented

1 Interstitial irradiation effectively devitalizes mammary cancer

2 The implantation of *gold radon seeds* should be preceded by *high voltage x-ray* therapy

3 The treatment should be completed in 3 weeks

4 The devitalizing dose for the most radio-resistant tumor 3 cm in diameter, or less, is 1200 per cent. S E D

5 The devitalizing dose for the most radio-resistant tumor 3 to 6 cm in diameter is 1300 per cent S E D

6 The method is unsuitable for tumors larger than 6 cm in diameter

7 Interstitial irradiation of the axilla is a difficult practical problem

8 If the radon seeds are implanted at the apex of the axilla, serious neuritis may follow

9 The implantation should be confined to the lower two-thirds of the axilla.

10 Dissemination of the disease from interstitial irradiation has not been observed

11 Delayed wound healing is due to one of 3 factors (a) excessive interstitial irradiation, (b) undue wound tension, (c) a short time interval between interstitial irradiation and surgical intervention.

12 Eighty-six per cent of the primary operable group treated by interstitial irradiation and radical surgery are alive, without disease, 1½ years after the beginning of treatment

13 Primary inoperable cases just beyond the borderline of operability are suitable for the method.

14 Serious pulmonary fibrosis is not induced by its use.

15 The technic should not be proposed as a routine preoperative procedure

16 A 5-year follow-up on these cases, and additional ones, may demonstrate that the technic is the most effective treatment yet devised for mammary carcinoma

17 Interstitial, combined with external, irradiation, without the use of surgery, can safely be advised and employed in well-selected primary operable cases

During the Cancer Symposium at the Twenty-first Clinical Congress of the American College of Surgeons, G L Cheatele (Surg Gynec Obst. 54 425 (Feb 15) 1932) reported 6 cases of cancer of the breast in which he had made microscopic whole breast sections

a number of months after interstitial radiation The dosage was 18,000 mg hours extended over 8 days He said

"I have examined microscopically whole sections of the entire parts removed, 5 of them 6 months and 1 of them 18 months after this treatment, with the following results

"In the first 5 cases, all showed what appeared to be complete regression clinically, and I discovered that most of the disease had been put out of action However, they all contained some carcinoma cells which looked to be active, viable, and potential sources of future extension of the disease Therefore, 3 factors should be borne in mind

"1 These particular cells may have been untouched by the treatment

"2 If they were untouched, the bed in which they existed may have been rendered incapable of supporting or allowing their further activity and that therefore they may eventually die

"3 I question as to whether these viable looking cells are biologically as active as they look

"In the sixth case I could not discover any active looking carcinoma cells at all Such a result suggests that if 18 months had elapsed in the 5 cases mentioned instead of only 6 months, they might also have shown the same efficient results as the sixth case I do not know And because I do not know, my present opinion is that it is safer to remove by surgical operation all breast carcinomata that are presumably clinically operable

"After this operation I externally radiate the whole area of the side of the thorax from which the diseased area has been removed I adopt this partly empirical plan in the hope that if there be any carcinoma cells left which are amenable to external radiation they will be destroyed

"As a rule, I do not submit a presumably clinically operable tumor to a preliminary external radiation. I admit that by so doing it might be proved whether or not the tumor in question is exceptionally radiosensitive, and thus the question might arise as to whether any surgical procedure would be indicated. But the fact remains that most of these tumors are relatively radioresistant, therefore, as a general rule, invaluable time would be wasted by postponing a radical removal of the disease."

Esophagus, Carcinoma Of.—J Palugyay (Strahlentherapie, 41 746, 1931) discusses his radiation treatment of cancer of the esophagus. He has treated 32 cases during the last 10 years. Of these, 23 have died, 9 in the third year, 5 in the second, and 8 in the first after the institution of therapy. Seven are at present undergoing radiation. Two patients are still alive and free from recurrence. One is a woman of 59, whose therapy was begun 4 years ago, and the other a woman of 56 first treated 8 years ago. In regard to technique, Palugyay advises a *gastrostomy* in all cases with a view to relieving the esophageal lesion from all local irritation by the passage of food. He employs combined *radium* and *x-ray* irradiation, the former as contact application under esophagoscopy or fluoroscopic control. Repeated verifications of the capsule's position during the period of its cavitory emplacement are essential.

J Guisez (Bull et mém Soc méd d hôp de Paris, 47 908 (June 1) 1931) presents his views on the treatment of esophageal carcinoma. He employs contact *radium* within the lumen 6 or 7 hours per day for a minimum total of 15 to 20 days, allowing occasionally a

day or two of rest. These treatments are well borne and the results are most encouraging. Normal deglutition returns and the patient gains in weight and strength. Lesions in the middle third of the esophagus are most favorably situated for radium therapy.

Genitourinary Organs, Carcinoma Of.—The methods employed at the Memorial Hospital of New York in the treatment of cancers involving the genitourinary organs are described by A. L. Dean, Jr (New England J Med 206:1078 (May 26) 1932). **Embryonal adenosarcomata (Wilms tumors)** of the kidney in children are quite responsive to irradiation and should be treated by *x-ray* or *radium* externally. Following the disappearance or marked reduction of the tumor, *nephrectomy* is performed. This type of growth metastasizes early and biopsy should not be performed.

Carcinoma arising in the pelvis of the ureter is best taken care of surgically. Radiation here does little good, as the malignant cells of this neoplasm are radioresistant and infection is commonly present. Dean states that he does not know of a case of renal adenocarcinoma (hypernephroma) that has been cured by radiation, despite its radiosensitivity. He advocates nephrectomy, since the extreme tenuity of the blood-vessel walls may determine a fatal hemorrhage under radiotherapy. Should metastases be present, they are treated by deep *x-radiation*. Postoperative treatment by *x-ray* is advisable as a prophylactic against recurrence. Neither papilloma nor cancer of the urinary bladder has been cured at the Memorial Hospital by external irradiation alone. *Fulguration* is effective in the treatment of most papillomata, while some should be attacked by direct *radon implants*.

Carcinoma of the bladder occurs in 2 forms, the papillary and the flat. The papillary form should be treated with *gold radon seeds* of 20 mc each implanted 1 cm apart so as to embrace the base of the tumor and an outlying zone 1 cm wide. This may be done through the cystoscope if the area can be well seen, otherwise, a *suprapubic cystotomy* is necessary. In the case of *flat infiltrating carcinoma*, whether large or small, the bladder is always opened and the *radon seeds* implanted into and around the growth.

In dealing with a projecting papillary mass, the *cautery snare* may be used to advantage in clearing the approach to the base, although the base itself should not be coagulated. Patients presenting themselves with **prostatic carcinoma** usually require immediate treatment directed to the relief of urinary retention and Dean emphasizes the necessity of *removing the obstruction* before employing radon, as the patient may otherwise die before obtaining the benefits of radiation. Prostatic cancers vary considerably in radiosensitivity but are, in general, radioresistant. Therefore, intensive interstitial irradiation has proved to be the only effective treatment, and has given 15 per cent of 5-year cures. The *radon implants*, or *radon-bearing needles*, are introduced under local anesthesia through the perineum as a general rule, although of late *gold seeds* have been implanted into the prostate through the opened bladder. **Cancer of the penis** is either papillary or flat. Each is a squamous cell carcinoma and resistant to radiation.

Inguinal adenopathy is present in the majority of cases (88 per cent. in Dean's experience) and may or may not indicate metastasis. Aspiration biopsy is of great value here and the presence of in-

fection must be ascertained, because radiation is powerless to overcome metastatic squamous cell carcinoma in infected lymph nodes. If the penile tumor is not over 2 cm in diameter and has not penetrated Buck's fascia, Dean recommends intensive surface radiation with a *radon plaque* as productive of excellent results. In the case of larger and more penetrating growths, radiation is contraindicated and *amputation* 1.5 cm proximal to any visible or palpable evidence of the disease is performed. In most cases it is possible to conserve enough of the penis to control the direction of the ejected urine or even to perform coitus. When the inguinal nodes show metastasis, they are treated palliatively with external radiation, or gold radon implants may be embedded in them. Block dissection is rarely carried out, as the lymph nodes are considered a protective barrier against the spread of malignant cells and are preserved if possible.

Teratoma of the testis is more responsive to radiation than is any other malignant tumor of the genitourinary organs. Instead of the 85 per cent mortality, which occurred under the older surgical methods, 85 per cent of cases coming for treatment while still operable should show 5-year cures under radiotherapy, and this record has been obtained at the Memorial Hospital. A patient with a testicular tumor and without demonstrable metastasis is given heavy *external radiation* to the testis and to the corresponding side of the abdomen. After regression, orchidec-tomy is performed. Postoperative radiation is then administered to the scrotum, groin, and pelvic and lumbar lymphatic areas. In the treatment of metastases from teratoma testis, external irradiation alone is employed.

Dean enunciates the following principles that are applicable to the treatment of genitourinary cancers as a general class

1 Irradiation is less effective in any patient when the quality of the blood is poor. Of course this condition frequently is only one of the manifestations of general weakness. To remedy this, all patients should be given the benefits of favorable hygiene. This includes a *liberal diet* to which is added *liver* or its extracts. *Transfusions of whole blood* frequently are of great value.

2 The exact histologic structure of each tumor should be known. Appropriate irradiation can be given only upon the basis of this information. In addition, there is little value to case histories which lack microscopic data. In most instances, this necessitates a biopsy. On the other hand, biopsies never should be performed upon primary renal or testicular tumors. Such treatment, in these cases, destroys important natural barriers and the growth fungates rapidly.

3 It has been demonstrated repeatedly in the use of *radon* interstitially that the first application is by far the most important. It should be thorough and adequate in amount. Perhaps the greatest danger in radiation therapy is the danger of insufficient treatment. Therefore, if an ample supply of radium is not available, some other method should be employed.

4 Recurrent tumors usually are less sensitive to radiation than primary growths. Destruction of natural barriers, such as capsule of a tumor or regional lymphatics, renders the prognosis more grave.

5. The presence of infection in the primary tumor or in metastases materially lessens the efficacy of radiation.

6 When careful examination of a patient reveals an incurable condition and irradiation has been employed simply for palliation, it happens not infrequently that there is a marked local regression. It is highly dangerous to reclassify such a case and treat it more intensively, perhaps operating, in the effort to achieve a cure. Only too often the resistance of the patient diminishes rapidly and death is hastened.

7 In the treatment of cancers of the genitourinary organs the field for palliative radiation has definite limits. In most cases the

greatest degree of palliation is accomplished when earnest efforts are made to obtain a cure. If radiation is part of the urologist's armamentarium, he should use it with judgment of the full extent of its possibilities.

I I Kaplan (Urol and Cutan Rev 36 40 (Jan) 1932) accepts the general teaching that in malignancy of the bladder and prostate, surgery followed by irradiation constitutes the best treatment. The average case, however, comes under observation with the disease well advanced and no longer operable in the usual surgical application of the term. For the radiation therapy of cancer of the bladder, Kaplan recommends the following technic: a cystotomy is performed and a stay suture is fastened in the bladder wall on either side of the lesion with a loose loop that is subsequently utilized in maintaining *radium tubes* against the periphery of the lesion. The dosage varies from 2000 to 5000 mg. hours delivered by 1 to 4 tubes containing 5 to 15 mg. of radium.

In treating cancer of the prostate, Kaplan employs *radium tubes* inserted directly into the gland through a perineal incision. From 5 to 15 mg. of element is used in each tube with a total dosage of 200 to 500 mg. hours. If urinary obstruction is present, a preliminary cystotomy for drainage is performed.

Hodgkin's Disease.—A U Desjardins (J A M A 99.1231 (Oct 8) 1932) describes his treatment of Hodgkin's disease with *x-radiation* of medium wave length, which, in most cases, he prefers to the so-called deep therapy. He advocates a course of x-ray consuming 6 to 12 days and applied not only to the nodes evidently affected, but also to the mediastinal and paraaortic groups. A second course of treatment is given 3 weeks after the first is com-

pleted, and a third, 1 month after finishing the second. The lower abdomen and pelvis of women under 38 or 40 years of age should not be irradiated, as an artificial menopause may complicate an already serious situation. Rapid reduction in the size of the involved lymph nodes is almost always obtained, symptoms caused by mechanical pressure are relieved and the general condition of the patient improved. The presence of a leukopenia, unless the leukocytes are below 1500 per c mm, is not a contraindication but an indication for x-ray therapy.

Hyperthyroidism.—The methods employed in the treatment of hyperthyroidism are reviewed by A. H. Williams (Radiology 18:553 (Mar) 1932), who concludes that radiotherapy is of paramount value in this condition. It appears that either surgery or x-ray will cure 50 to 75 per cent. of all cases and effect definite improvement in 15 to 25 per cent. more. Williams reports his experiences with 200 cases of thyroid disease. He employs x-radiation directed to the gland through one 10 × 12 cm. portal. The K V is 125, the M A 5, the filter 3 mm. Al, and the skin-target distance is 36 cm. The time is adjusted to give 40 to 55 per cent. of an erythema dose in the average case. Approximately 10 treatments are given at intervals of 1 week. Iodine is not administered in connection with the x-ray therapy. In 165 cases of his series, Williams obtained an average gain in weight of 8 lbs (3.6 Kg), and, in 29 cases, an average loss of 4.3 lbs (2 Kg). Six patients showed no change. The average drop in the pulse for the entire series of 200 cases was 24.2 beats per minute, and the average drop in the basal metabolic rate was 23 points.

Definite cure was obtained in 80.5 per

cent of the cases and 13.5 per cent were improved. One per cent developed subthyroid symptoms and 1 per cent malignancy. Thirty-four patients were clinically of the exophthalmic type. In this subgroup 70 per cent were cured and 17 per cent improved.

Rectum, Carcinoma of.—Writing from Regaud's clinic, A. Lacassagne (Radiophys. et radiothérapie 2:577, 1932) recommends that all operable tumors of the rectum be treated by surgical excision with one exception, *i.e.*, the squamous cell growths of the anus, and this despite the fact that surgery here carries an operative mortality of 25 per cent, and that the 3-year cure rate on operable cases rarely exceeds 30 per cent. The majority of rectal carcinomata are inoperable when first seen, and the final salvage of all cases presenting themselves for treatment is hardly 12 per cent. The typical adenocarcinoma of the rectum is highly radio-resistant, the number of cures obtained by radiation alone is so small as to be profitably disregarded. During the years 1919-1929, 49 cases of cancer of the rectum were treated in Regaud's clinic by various techniques. Of these cases, 40 were definitely inoperable. The methods of treatment were 5 in number:

1. Introduction of *radium* or *radon* in an applicator into the rectal lumen. The time was 3 to 7 days. No benefit was obtained and in several patients the symptoms were made worse.

2. *Implantation of needles* around and into the tumor itself through the perineum or through the anus. Here the growth often regressed and the general condition of the patient improved, but no cure was obtained.

3. Combination of *radium* and *surgery*. Following coccygeal excision, radium or radon was placed around the rectum for 4 days. No cures resulted except in 1 case, where the rectum was removed surgically.

2½ months later The excised rectum, however, showed microscopic evidence of persisting malignancy Hence this 5-year cure must be credited to surgery

4 External radiation by means of a 4-gram *radium pack* at 10 cm through multiple fields No cases were cured, although more than half of them survived 2 years, and 1 was alive after 3 years

5 *X-ray*—Here the results proved essentially the same as those obtained by means of the radium pack One patient was given a surgical excision of the rectum for recurrence and is now alive and well after 8 years

Upon the basis of this work it may be confidently asserted that radiotherapy of rectal cancer has not effected a single cure Those that still survive have surgery to thank

C Gordon-Watson (Surg Gynec. Obst 54 307 (Feb 15) 1932) relates his experiences with the use of radium in rectal cancer During the past 7 years he has made over 200 applications, employing various methods previously described He emphasizes the dependence of success upon a uniform and adequate barrage directed against the growth and the lines of lymphatic spread In cases where radical surgery appears reasonably likely to succeed, the use of radium as a routine is not justified When dealing with inoperable carcinoma of the rectum, *radium* is frequently of service and may make the patient symptom-free for years, the growth being replaced by a cicatrix In advanced and hopeless cases, intra-rectal *radon seeds* may control excessive discharge, discomfort and pain, thus obviating the necessity for a surgical procedure that might only aggravate the disease or provoke sepsis The best field for radium in rectal cancer appears to be in the conversion of a fixed and inoperable growth into one that may be dealt with by radical excision **Squamous cell carcinoma of the anal re-**

gion is quite responsive to interstitial radiation and here radium proves a most useful therapeutic agent. Gordon-Watson states that he recognizes that there is much more to be done before an attempt can be made to dogmatize In the present state of knowledge he regards *radium* as a useful *adjunct to surgery* in skilled hands, and as a dangerous weapon in unskilled hands It cannot replace surgery in rectal cancer, though it bids fair to do so in **epithelioma of the anus**. He further states that the rectal surgeon should regard radium as a spare horse to his team He must recognize that this spare horse is not fully broken and is capable of dangerous antics When harnessed to the team, a careful and experienced driver is required, if disaster is to be avoided

Upper Respiratory Tract, Carcinoma of.—In discussing the radiotherapy of cancer occurring in the upper air passages, W D Harmer (Lancet 2 1057 (Nov 14) 1931) states that in cases of **laryngeal carcinoma**, interstitial *radium* has produced such good results, he no longer considers surgery indicated In the event that a recurrence appears, radium may again be employed if the lesion is a small one, but, in the main, surgery rather than irradiation is then to be advised In borderline cases, a combination of radiation and surgery is most desirable. **Carcinoma involving the nose** is difficult to eradicate but may be controlled by irradiation over a long period of time, and in these cases surface applications of radium together with interstitial radium along the malignant margins is productive of the best results **Growths in the nasal accessory sinuses** are ineffectively treated by operation alone, but *surgery plus radiation* gives a better prognosis Inoper-

able cases, as a rule, remain unimproved under any form of treatment. Tumors of the nasopharynx are characterized by a high degree of malignancy and *x-rays and radium* should be employed in combination. When dealing with endotheliomata of the palate, nasopharynx, pharyngeal wall and neck, *x-rays* are used, a week allowed to elapse and then *enucleation* performed with the postoperative application of *radium*. In cases of carcinoma of the tonsil and adjacent parts of the pharynx, surgical intervention is contraindicated. *Radium needles* should be implanted and residual parts of the growth subjected to *electrocoagulation*. In these patients, the lymphatic areas of the neck must receive pre- and post-operative irradiation. Malignant lesions of the uvula and soft palate are decidedly more dangerous. They too should be handled with *x-ray, radium* and *electrocoagulation*.

E. G. E. Berven (Am J Roentgenol 28 332 (Sept) 1932) gives his experiences with the treatment of tumors of the oral and nasal cavities at the Radiumhemmet, Stockholm. He finds the treatment of these growths particularly difficult because of the obstacles encountered in making an early diagnosis, the pronounced malignancy that prevails, the frequency of secondary infection, the tendency of the neoplasm to invade bone and cartilage, the failure of surgery in these localities, the relative radioresistance of the tumor and the high degree of radiosensitivity of the adjacent normal tissues. Most of these growths are well differentiated epidermoid carcinoma, a radioresistant type. Berven's plan of attack comprises preoperative radiation and subsequent surgery. *Radium* is employed in the form of a teleradium pack, local sur-

face applicators and interstitial needles. The pack contains 3 Gm (45 grains) of radium filtered through the equivalent of 5 mm of lead and is used at a distance of 6 cm. The surface applicators are applied with dental compound with a filter equivalent to 1 to 3 mm of lead. The radium needles for implantation contain 5 to 10 mgm of the element and have a filtration value equivalent to 1 mm of lead. The surgical procedure consists in the application of *endothermy* with bipolar coagulation of the tumor and its surrounding area. It is believed that this endogenous heat followed by an intense exudative inflammation in the adjacent tissues may be of decided importance in killing any remaining neoplastic cells.

Berven gives his statistics of 278 cases of carcinoma of the oral cavity from 1916 to 1926 inclusive as follows

	No of Cases	5-yr Cure	Per Cent.
Carcinoma linguae	104	33	32
Carcinoma sublinguale	32	11	34
Carcinoma mandibuli	61	11	18
Carcinoma buccae	81	21	26
Total	278	76	27

Berven treats cancer of the upper jaw by, first, *x-rays*, then *endothermy* after Holmgren's method, then *radium* applied directly in the wound.

In reporting his experiences with 165 cases of tonsillar malignancy observed since 1911 at the Howard A. Kelly Hospital of Baltimore, C. F. Burnam (Surg Gynec Obst 55 633 (Nov) 1932) states that the progress of the disease is usually rapid and despite the location of the lesion where it interferes with speech or deglutition and tends to ensure a relatively early medical consultation, 70.3 per cent of this series of cases presented marked glandular involvement when first seen.

at the hospital. The most frequent initial symptom is pain, either local or radiating to the ear, neck and head. Occasionally a glandular mass in the neck was the first indication of the

Hodgkin's and ordinary chronic infections, which may affect the intraoral structures or the glands of the neck and thus present a similar clinical picture. Secondary tumors of the tonsil are

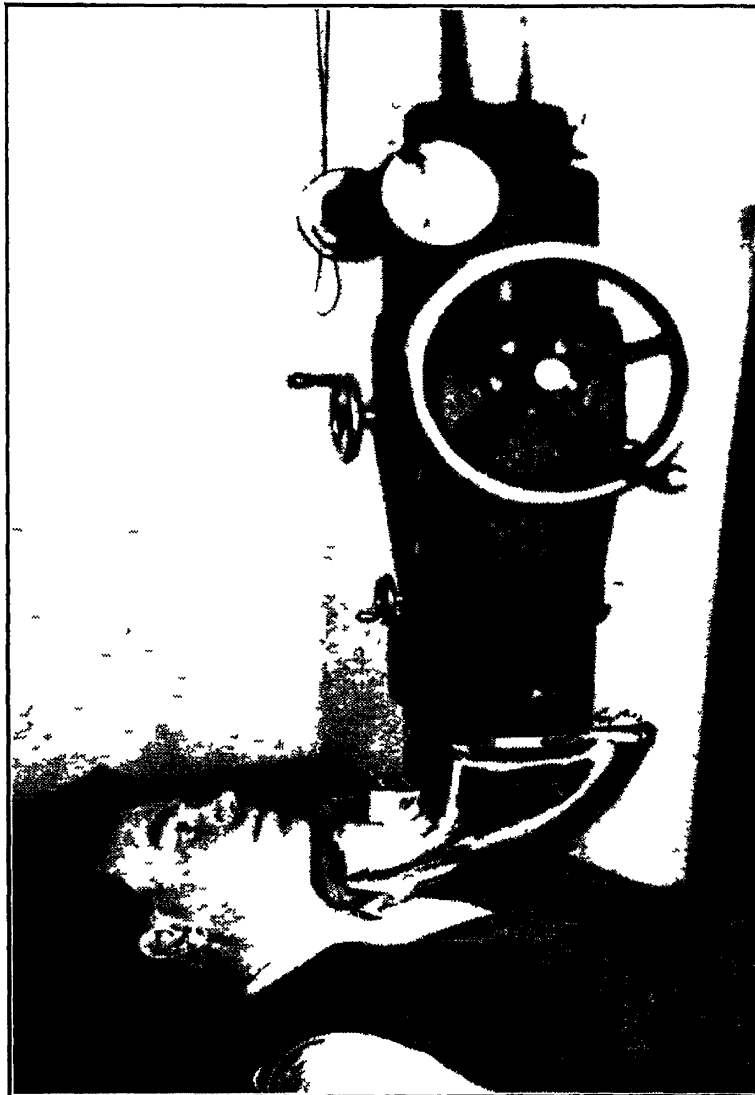


Fig 2—Teleradium apparatus (E G E Berven Am J Roentgenol)

presence of the tonsillar growth. A few epitheliomata have produced merely dysphagia, no visible lesion appearing in the mouth for several months. Persistent pain in the throat in a patient past 40, therefore, should always place the physician on guard. Microscopic diagnosis is essential for proper classification and for the exclusion of other conditions such as syphilis, tuberculosis,

decidedly rare. The primary growths are classified as mixed tumors, sarcomata and epitheliomata.

In treating these neoplasms, Burnam recommends implantation of screened *radon tubes* and the use of external radiation from either the usual 200 K V machine or the *radium pack*. The radiosensitivity of the mandible and the salivary glands should be borne in mind

and efforts made to spare them during the cross-firing which is so essential

Uterus, Carcinoma of.—Some statistics are presented by J Heyman (*Acta radiol* 13 329, 1932) covering cases of cancer of the uterus and ovaries treated at the Radiumhemmet and observed for periods of 5 years or more. Of 1237 cases of carcinoma of the cervix, 259, or 20 per cent, were alive and well at the expiration of 5 years. Of 80 cases of carcinoma of the corpus uteri, 42.5 per cent

Carcinomas of the ovaries are grouped as follows: of 24 inoperable cases, 8.3 per cent; of 36 cases nonradically operated, 20 per cent; of 28 cases showing recurrences after radical operation, 25 per cent; of 46 radically operated cases having postoperative treatment, 54 per cent

The cases upon which the above statistics are based were, almost without exception, treated by *intrauterine* and *intravaginal radium*.

I de Buben (*Surg Gynec Obst* 54 791 (May) 1932) relates his experience with 101 cases of cancer of the body of the uterus at the First Gynecologic Clinic of the University of Budapest. Of these, 56 were operable and were treated surgically, while 45 received radiotherapy. De Buben favors a *vaginal hysterectomy* in operable cases and presents a 5-year cure rate of 42.9 per cent. The radiation treatment comprises *x-ray* and *intrauterine radium* (50 to 75 mgm with a filter equal to 1.0 mm of platinum for a total of 2400 to 3600 mgm hours at 1 sitting). Of the 45 patients with inoperable cancer of the uterine body receiving radiotherapy, 26 were under observation for a sufficient length of time to establish a 5-year cure rate of 15.3 per cent. De Buben emphasizes the necessity of

dilating the cervical canal to a larger diameter than that of the radium tube to be inserted in order to ensure adequate drainage during treatment. A rise in temperature while the radium is in the uterus is frequently the result of retained secretions. Strict asepsis is imperative in the vaginal and uterine manipulations.

C F Burnam (*Ann Surg* 93 436 (Jan) 1931) discusses his radiation treatment of cancer of the body of the uterus in the Howard A Kelly Hospital, Baltimore. He finds cancer of the body distinctly rare as contrasted with cancer of the cervix (1 to 4) and recurring at an average of 57 years. From the standpoint of treatment the cases are divided into

- I Early operable
- II Late borderline and inoperable
- III Recurrent after operation
- IV Metastatic

If the growth is limited to the uterus, 2 methods of treatment are possible, *hysterectomy* and *radiation*. Surgical removal has long been practiced but Heyman, of the Radiumhemmet, has presented statistics of 5-year radiation cures that compare favorably with the results obtained by surgery. Heyman himself, however, feels that operation is still the method of choice when not contraindicated by old age, corpulence, hypertension, organic heart disease, nephritis or diabetes. If the disease has passed beyond the confines of the uterus, the field of surgery is sharply restricted, while radiation still offers a hope of cure. In those cases presenting metastasis beyond the first regional glands, surgery is contraindicated. This is also true of those in which recurrence has taken place after hysterectomy.

When surgery is decided upon in any given case, abdominal *panhysterectomy*

is the method of choice. The cervix and the top of the vagina should be included. A considerable primary mortality is unavoidable and ranges from 6 to 15 per cent in reports taken from the general literature. When radiation is employed, Burnam places his chief reliance upon *intrauterine radon*. One to three curies are divided into 4 to 6 equal parts in glass filtered through 1 mm of brass and 3 mm of rubber, while the total dosage is from $2\frac{1}{2}$ to 3 "gram-hours". *Crossfire radiation* (*x-ray* or *radium pack*) may be added, but should be used continuously and directed principally to the iliac nodes and lateral pelvic walls.

Burnam's series shows the following results. Of comparatively early cases, those treated by operation alone gave 60 per cent of 5-year cures, those treated by radium alone gave 69 per cent; those treated by radium and operation, 55 per cent; those treated by operation and radium, 100 per cent (only 4 cases in this group). Of advanced inoperable cases 21 per cent showed a 1-year cure. Of recurrent cases, 83 per cent showed a 5-year cure. Of cases already showing metastasis, none was cured. The total series numbered 112 and the cure rate for the entire group was 187 per cent.

Burnam believes that radiation is fully comparable to the best of surgery in operable cancers of the body of the uterus, offers a possibility of cure in a considerable percentage of inoperable and recurrent growths, affords valuable palliation in metastatic cases and does not increase the dangers of surgery when administered preoperatively.

Cancer involving the female genital tract commands more and more space in current medical literature. The spectacular results secured by radiation

in favorable cases of carcinoma of the cervix and the pronounced palliation in advanced and inoperable pelvic malignancy have focused the attention of the profession upon *radium* as a powerful therapeutic agent in the control of cancer. A survey of the reports from leading gynecological clinics indicates an increasing tendency to rely upon radiation in the treatment of uterine carcinoma either entirely or with more or less conservative surgery as an adjunct.

F. Voltz (Brit. M. J. 2:307 (Aug 13) 1932) states that since 1912 Doederlein has treated every patient admitted to the Munich Clinic by radiotherapy alone, the number of cases so treated during 20 years amounting to 3000, with a 5-year cure rate of 18.5 per cent in 1723 cases (1924-1926).

The results obtained at the Radium Institute of the University of Paris (Regaud, Lacassagne, etc.) and at the Radiumhemmet of Stockholm (Forssell, Heyman, etc.) speak for themselves. Lacassagne reports 678 cases of uterine cancer with 26 per cent of 5-year cures; Heyman, 500 cases with 22.4 per cent; Healy, 1574 cases with 22.5 per cent. In this connection it may be of interest to quote Victor Bonney (*Ibid*) upon the surgical treatment of carcinoma of the cervix in his clinic. He said, "that between May, 1907, and May, 1927, he had performed Wertheim's operation 339 times, 52 patients had died of the operation, 135 had died of recurrence before 5 years; and 132, or 41.3 per cent, were alive and well after 5 years. Of the 339 cases, invasion of the regional gland had been present in 143 (42 per cent). In the gland-invaded group the operated death rate was 21.6, as against 10.7 per cent in the noninvaded group. The relative

cure rate of the gland-invaded group was only 23.7 per cent, as against 50 per cent in the noninvaded group. He reckoned his operability rate at 63 per cent, giving an absolute cure rate of 24.5 per cent. Bonney then analyzed his cases on a basis of 10 years' freedom from recurrence, the absolute cure rate being 19.1 per cent, or with deductions, 20.8 per cent. He demonstrated that the operation death rate in his series had fallen from 20 per cent in his first 100 operations, to 9 per cent in the last 128. If they formed their statement on the 10-year basis, then they could say that the operation cured 1 out of every 5 patients seen and 1 out of every 3 patients operated on."

The treatment by radium of **cervical cancer** in the gynecological clinic of Geneva since 1914 is described by Koenig and Held (*Schweiz med Wchnschr* 61 1069, 1931), and they cite 376 cases divided into 4 groups, according to the extent of the disease: in Group I were 11.47 per cent of cases, in Group II, 17.82 per cent, in Group III, 31.91 per cent, in Group IV, 38.83 per cent.

Regaud's technic is followed except that the radium is allowed to remain until 7200 to 7500 mc hours have been given, instead of removing and replacing it daily, as is done at the Radium Institute in Paris. The cure-rate in 286 cases treated between 1914 and 1925 was as follows: Group I, 43.7 per cent, Group II, 16.3 per cent; Group III, 16.9 per cent; Group IV, 1.6 per cent.

In relating his experiences in treating carcinoma of the cervix with small quantities of *radium*, M. Cutler (*Surg Gynec Obst* 55 481 (Oct) 1932) expresses his belief that a small amount of radium acting over a longer period of time is just as effective as is

a large amount acting for a shorter period. From the standpoint of expense, this is of extreme importance. Furthermore, it is known that normal tissues can better tolerate a given dose when the time of application is prolonged. Cutler aims to administer a total dose of 7000 to 8000 mgm hours equally divided between the cervical canal and the vagina. He employs applicators containing a total quantity of radium element of 60 to 80 mgm filtered through 1.0 mm of platinum, and requiring approximately 5 days to deliver the necessary dose. This technic, as will be seen, is quite similar to that employed by Regaud at the Radium Institute of the University of Paris. In Cutler's Tumor Clinic at the Michael Reese Hospital, Chicago, this internal radium treatment is promptly followed by external application of a 4-gram radium pack in an effort to increase the radiation delivered to the parametrium. Seven portals of entry are employed, each 10 cm in diameter, with the pack at a distance of 10 cm, and carrying a filter equivalent to 1.5 mm of platinum. Each field is given 30,000 mgm hours with these factors, the patient being treated for 2 hours daily for about 26 days.

A combination of *preoperative radiation* and subsequent *hysterectomy* is used by A. Mayer (*Strahlentherapie* 42 759, 1931) in the treatment of **cancer of the cervix**. He has followed this plan for 10 years and found it highly satisfactory. He uses intra-cervical radium with a total dose of 2400 mgm hours divided into 3 applications according to the Radiumhemme technic. Hysterectomy is performed about 3 weeks after the irradiation has been accomplished. In 56 per cent of 101 cases the carcinoma could no longer

be found upon superficial inspection at the time of operation, although histologic study showed persistent tumor cells in 20 per cent of these uteri. Mayer believes, therefore, that the surgical removal of the irradiated uterus is a valuable procedure in eliminating quiescent cancer cells that have survived radiotherapy. In 26 cases he had 28 per cent of 5-year cures.

A review of the literature dealing with the various preoperative and postoperative radiotherapeutic procedures applied to carcinoma of the cervix is offered by H. Kamniker (Arch f Gynak 147 390, 1931) and he compares them with the practice of the First University Frauenklinik of Vienna when dealing with pelvic malignancy. The *preoperative* application of radium, Kamniker states, may produce (1) cessation of hemorrhage and suppuration if present, (2) clearing away of the operative field for subsequent surgery, (3) reduction of infiltrate in the involved parametria.

Nevertheless, this procedure is not employed at the Vienna clinic because it is believed that the surgical operation is rendered more difficult, that valuable time is lost and that, even without radium, the danger of peritoneal complications in vaginal hysterectomy is relatively slight. *Postoperative irradiation* (begun by Adler in 1913) has proved decidedly beneficial, as shown by the following table of cases operated upon for carcinoma of the cervix during the period 1921 to 1925.

Hysterectomy combined with *postoperative radiation* of the pelvis by radium and x-ray is advocated by L. Adler (Am J Obst and Gynec 23 332 (Mar) 1932) for carcinoma of the cervix.

The standard method consists of surgical removal of the uterus and the insertion of a 50 mgm screened tube of radium into each parametrial area where the operative wound was made, 600 to 800 mgm hours being the total dosage delivered in this manner. If the uterosacral ligaments are under suspicion, 3 to 4 mgm in tube form is applied here. Two months after operation, 6 to 8 irradiation treatments are carried out with the radium placed in the rectum and vagina for about 3 hours. X-rays are also employed and are divided into 3 series of treatments from 3 to 6 months apart.

COMPLICATIONS — Guilhem and Gouzy (Presse méd 40 242 (Feb 13) 1932) discuss the occurrence of *pyometra* following the intrauterine application of radium. Of 751 cases of cervical cancer, this condition developed in 1 per cent. Pyometra appears from a few weeks to several months after radium and is divided clinically into 2 varieties, that with the cervical canal open and that with it closed. In the open type the symptoms are mild and the prognosis good, in the closed, the symptoms may be quite grave and the prognosis poor. Possible complications of pyometra are rupture of the uterus, with spreading peritonitis, phlebitis of

Patients Alive After	1 Yr	2 Yrs	3 Yrs	4 Yrs	5 Yrs
95 with postoperative radiation	89	74	68	64	61
114 without postoperative radiation	89	70	58	53	53

These statistics indicate a 5-year cure rate of 64.2 per cent in postoperatively radiated cases as against 46.5 per cent in those not so treated.

the pelvic veins, pelvic peritonitis or cellulitis, and general septicemia

Treatment consists of *serum therapy* and *dilatation of the cervix* with *drainage* of the uterine contents. In selected cases *hysterectomy* may be performed, although pelvic complications already present may render this procedure difficult and hazardous

X-RAYS.—INTRODUCTION.—

X-ray therapy is applicable to a wide range of benign and malignant conditions, and, in a broad sense, it may be said that the therapeutic indications for x-rays and radium are the same. Fewer technical expressions are employed in roentgenology than is the case when dealing with radium, nevertheless a few explanations of some of the more frequently recurring terms may prove acceptable to the general reader

Superficial therapy means the employment of x-rays in the treatment of diseases occurring on the surface of the body or at a short distance beneath it. These x-rays are generated at a voltage of 130 K. V or less, they have a relatively long wave length and a relatively low power of penetration into the tissues of the body. *Deep therapy*, on the other hand, refers to the use of x-rays in the treatment of deeply situated disease, such as intraabdominal malignancy. These rays are generated at a voltage of 190 K. V or over, have a relatively short wave length and have pronounced power of deep penetration. The abbreviation S U D means *skin-unit-dose*, or the quantity of irradiation necessary to produce an erythema of the skin under standard conditions. H E D stands for *Hautemheiddosis*, the same thing expressed in German. The small letter "r" stands for "roentgen," the international unit of *x-ray dosage*. "H" and "S" refer to the earlier units of

Holzknicht and Solomon which are no longer in general use. One S U D (H E D) is roughly equivalent to 700 "r," though it varies with wave-length. Dosage is also frequently expressed in milliamperes-minutes, giving kilovoltage, filter and distance between the target of the tube and the skin over the area irradiated. For the biological effects of x-rays, see under Radium

The field of *x-ray diagnostics* has expanded considerably within the last few years and a number of important developments have claimed the attention of both internist and surgeon in both general and special lines of their work. Among these may be mentioned the following: Visualization of the subarachnoid and ventricular spaces of the spinal cord and brain, with the demonstration of tumors, cysts, atrophies, deformities and inflammatory processes, visualization of the pathological changes in many of the soft tissues, such as the prevertebral structures of the neck, demonstration of hepatic and splenic neoplasms, cysts and vascular changes, such as thrombosis and infarct, the demonstration of, and differentiation between, benign and malignant tumors of the breast

In the field of x-ray therapy, an outstanding advance is the general adoption of an international unit of x-ray *dosage*, the "roentgen" ("r") already referred to. This unit was officially adopted at the Second International Congress of Radiology held at Stockholm, in 1928, and confirmed by the Third International Congress, at Paris, in 1931. It is defined as "that quantity of x-radiation which, when the secondary electrons are fully utilized and the wall effect of the chamber is avoided, produced in 1 c.c. of atmospheric air at 0° C and 76 cm. mercury pressure, such a degree of conductivity that 1

electrostatic unit of charge is measured at saturation current" This simply means that the well-known properties of the x-rays whereby they ionize air and thus render it a conductor of electricity are utilized in measuring the x-ray beam A known volume of air under standard conditions of temperature and pressure is placed in the path of the x-rays and the quantity of electricity which this air will then allow to pass is read off on the galvanometer or electro-scope as a measure of the x-radiation It should be noted, however, in this connection, that when estimating the biological effect, the dominant wave length of the x-ray beam must be taken into consideration

As far as *apparatus* is concerned, machines are now on the market that are absolutely shock-proof All high tension wires as well as the x-ray tube are enclosed in a metal case, together with the transformer, so that the operator or patient can come into direct contact with the apparatus without any electrical hazard whatever Research engineers are engaged in perfecting therapy tubes that will operate under higher and higher potentials across their terminals in order that the x-rays so generated may approximate in wave length the gamma rays of radium with their valuable therapeutic properties

DIAGNOSIS.—Breast Disorders.

—The x-ray changes observed in the normal breast at various epochs in the patient's life and at the various stages of the menstrual cycle are described by P S Seabold (Surg Gynec Obstet. 53 461 (Oct) 1931) A distinctive feature of the normal breast is the triangular shadow seen on the x-ray film, the base lying along the pectoral fascia and the apex directed to the nipple This shadow contains numbers of lines

radiating from apex to base representing the mammary ducts with their supporting fibrous tissue Alterations in this triangular area form the basis of the x-ray diagnosis of breast disease Abnormal involution gives the appearance of numerous, small, overlapping areas of different radio-opacity from the rest of the mammary tissue **Carcinoma** shadows are irregular and fade off into their surroundings, presenting a "lace-like" contour **Benign growths** displace their confining structures as seen on the x-ray film, and usually have relatively clear cut borders **Cysts** cast similar, but less dense shadows. **Meta-static involvement** of the pectoral lymph nodes is readily demonstrable by the x-rays.

Attention is called by W W Fray and S L Warren (Ann Surg 95 425 (Mar) 1932) to the diagnostic advantages inherent in stereoscopic roentgenography of the breast This method of examination differentiates inflammatory processes from malignancy and detects metastasis to pectoral and axillary lymph nodes Furthermore, a permanent record is obtained so that future comparisons can be made Acute mammary changes produce soft, indistinct and diffuse shadows, chronic diseases give denser, more compact and more sharply outlined opacities. Cysts are distinguished from fat lobules in this way Carcinoma originates in a single, localized area and produces a compact mass with an irregular and poorly defined periphery As the malignant process advances, the breast pattern suffers more and more distortion and the thin, clear zone between the base of the breast and the pectoralis major is often invaded These changes serve to establish the diagnosis of malignancy as against mastitis and this method of ex-

amination has proved accurate in 85 to 90 per cent of operated cases

Of Fetal Death.—M A Schnitker, P C Hodges and F E Whitacre (Am J Roentgenol 28 349 (Sept) 1932) present their experiences in the x-ray diagnosis of fetal death covering a series of 176 pregnancies, in 14 of which the fetus was proved to be dead. Their conclusions are as follows

Based on a study of x-rays of 176 cases of pregnancy in which the fetal age at the time of x-ray examination ranged from $3\frac{3}{8}$ months to over term and in 14 of which the fetus was dead, the following conclusions have been drawn.

1 X-ray demonstration of overlapping of the skull bones of a fetus *in utero* is fairly reliable evidence that the fetus is dead, provided the patient is not in labor and that care has been taken to exclude pseudo-overlapping due to the overlying images of sutures and fontanelles

2 Absence of overlapping means little. Conclusive evidence is lacking as to the exact relationship between the date of fetal death and the development of the sign, but all agree that some time must elapse. A faint fetal shadow may mask overlapping, hydrocephalus may prevent its development

3 Spinal angulation and thoracic collapse appear to be of doubtful value as criteria of fetal death

4 It is dangerous to diagnose decalcification in every instance of a faint or blurred fetal shadow, because early in pregnancy the appearance may be due to a failure to calcify rather than a loss of calcium previously present, even in well calcified skeletons, excessive amniotic fluid, respiratory movement and many technical factors can produce the same appearance. Furthermore, quan-

titative information is lacking as to the calcium content of the human fetus, either macerated or normal, and some embryologists and clinicians insist that no decalcification occurs in maceration

5 Anthropometric data published by Scammon and Calkins allow a reasonably accurate opinion as to the age of a fetus if its occipito-frontal diameter is known. Even with very coarse x-ray measurements of this diameter, x-ray estimates of fetal age have agreed surprisingly well with the actual age (as estimated from menstrual or delivery dates) in a considerable number of cases. Disproportion between ages thus calculated and the supposed duration of gestation constitutes a valuable criterion of fetal death, and accurate fetometry by stereo-roentgenographic methods ought to improve the validity of the diagnosis

6 Absence of any one or all of the criteria does not exclude the possibility that a fetus is dead, because they all depend upon the degree of maceration. It seems worth while, therefore, to point out that the x-ray diagnosis of movement of a fetal part occurring during the x-ray examination constitutes conclusive evidence of fetal life

In Intracranial Diseases.—A W Adson (*Ibid* 27 657 (May) 1932) relates his experiences with x-ray diagnosis of intracranial disease by means of pneumoventriculography and encephalography as carried out in The Mayo Clinic. The surgical technic employed in ventriculography is as follows. Under local anesthesia a trephine opening is made over the posterior horn of each lateral ventricle and bilateral aspiration with ventricular needles performed. If a communicating hydrocephalus is present, unilateral aspiration is sufficient. The size of the lateral ventricle can be readily determined during this pro-

cedure, also the patency of the foramen of Monro

Films are now made as follows one anteroposterior view together with lateral stereoscopic views. For better demonstration of the third ventricle, aqueduct of Sylvius and fourth ventricle, a lateral view should be obtained with the face downward and the head in a dependent position. When making an encephalographic examination, 60 to 200 c c of cerebrospinal fluid is withdrawn by lumbar puncture and air injected in its place. This procedure is contraindicated in the presence of increased intracranial pressure. It should always be carried out with caution, the substitution of air for fluid being made slowly, as symptoms of shock usually arise, particularly when the patient is in the customary sitting posture. Stereoscopic films are then made with the patient upright. *Ventriculography* is applicable to the diagnosis of neoplasms of the posterior fossa, frontal lobe, temporal lobe, parietal lobe, occipital lobe, third ventricle and lateral ventricles, basal nuclei, hypophysis and epiphysis and corpus callosum; parasagittal tumors, cortical meningiomas and meningiomas of the olfactory groove, pachymeningitis hemorrhagica, gliosis and degeneration of lesions of the hemispheres, cortical thrombosis and arteriovenous aneurismal varices. *Encephalography* may disclose neoplastic changes as above described with the addition of cortical deformities overlying the tumor areas, convolucional atrophy, destructive, traumatic and meningitic lesions. Adson, however, sounds a note of warning against the indiscriminate use of these procedures, since they are by no means devoid of danger, are always distressing to the patient and may, in many cases, afford no more information than could have been ob-

tained by a painstaking neurological examination

In Liver and Splenic Disorders—The development of radiographic methods for the visualization of liver and spleen by means of contrast substances injected into the blood stream is traced by S. Kadrnka (Bull et mém Soc de radiol méd de France 19.104, 1931). According to the writer, this was first tried (for the liver) by Einhorn, who employed tetraiodophenolphthalein in experimental animals. Later, the visualization of these organs was attempted by Oka, of Japan, and Radt, in Germany, using "tordiol," a colloidal substance of thorium base. This agent produced good x-ray images in animals, but injections into human beings provoked reactions of intolerance. In addition to this, it must be borne in mind that non-stabilized colloidal substances (tordiol, umbrathor, etc.) may determine the precipitation of biocolloids within the organism, hence the definite hazard of the procedure.

Kadrnka advocates the intravenous use of a new contrast substance for hepatosplenography called "*thorotrast*." This preparation is a stabilized colloidal suspension which does not produce precipitation as do the unstabilized ones. It carries 22 per cent by weight of thorium and is abstracted from the circulation chiefly by those cells of the reticulo-endothelial system contained in the liver and spleen, as a result of which these organs are rendered radioopaque. The dose is 0.8 to 1.0 Gm ($12\frac{1}{2}$ to 15 grains) of thorotrast to each kilogram ($2\frac{1}{4}$ lbs) of body weight and this is divided into 4 to 6 portions injected over a period of 4 to 6 days. Twenty-four hours after the last injection, the x-ray films are exposed. Kadrnka feels it is too early to enumerate the indica-

tions for this form of examination, but mentions the following neoplasms, cysts, abscesses and cirrhosis. He believes the method contraindicated in any severe and generalized parenchymal changes in spleen or liver. A transient reaction of no consequence follows the usual dose in the average case.

A. P. Pons and J. M. V. Sabater (Rev. med. de Barcelona 9 16 (Jan) 1932) report 14 cases in which *hepatosplenography* was performed with *thorotrast*. These cases included 2 with *hydatid cyst*, 1 leukemia, 3 with *pulmonary tuberculosis* with enlargement of liver and spleen and 1 with *ankylosis*. The average dose of *thorotrast* was 75 cc with an initial injection of 0.4 to 0.6 cc per Kg of body weight. Three injections in all were given, the intervals being from 1 to 3 days. Forty-eight hours after the last dose is usually the proper time to make the x-rays, although good films may often be obtained 24 hours after the first. In this series of 14 cases no complications such as fever, malaise or headache were noted. One anemic and luetic patient complained of dizziness, abdominal discomfort, chills, tachycardia, and muscular twitchings. These symptoms disappeared after *caffeine* and *adrenalin*, and did not reappear following further injections of *thorotrast* if *adrenalin* was given before.

Various hemorrhages appeared with some degree of frequency. These comprised epistaxis, hematemesis, hemoptysis and melena, and 2 of the patients suffering from advanced cirrhosis of the liver died apparently from loss of blood.

Pons and Sabater noted the slow elimination of *thorotrast*. Some cases x-rayed after 3 months showed the same density of shadows as was obtained at the original examination. The exact

mode of elimination has not been determined, although *thorotrast* given intravenously has been recovered from the bowel. The conclusions reached are as follows.

This method of *hepatosplenography* shows the size, position and contour of the organs and is capable of revealing the presence of tumors, cysts and abscesses. In patients with diffuse neoplasms, severe cirrhosis or leukemia, no shadows may be obtained. The recognized *contraindications* are leukemias and various hemorrhagic conditions.

C. H. Warfield (Radiology 19 311 (Nov) 1932) reviews the development of contrast medium radiography as applied to the liver and spleen by W. S. Keith and D. R. Briggs, using iodized rapeseed oil (Proc. Soc. Exper. Biol. and Med. 27 538 (Mar) 1930), by P. Radt, using dioxide of thorium (Med. Klin. 26 1888 (Dec 19) 1930), by M. Oka, also employing this medium (Fortschr. a. d. Geb. d. Rontgenstrahlen 41 802, 1930), and especially by S. Kadrnka (Schweiz. Med. Wchnschr. 61 425 (May 2) 1931), who employed a stabilized thorium dioxide solution known as *thorotrast*. Warfield presents the pathologic findings in a patient with *carcinoma of the cecum* who had been examined with *thorotrast* prior to death.

Microscopic studies revealed the deposition of thorium dioxide crystals in the reticular cells of bone-marrow, spleen and lymph nodes and in the Kupffer cells of the liver. *Thorotrast* given to a case of *splenomyelogenous leukemia* produced no alteration of the white blood count nor effected any change in the size of the spleen. An excised liver containing thorium dioxide caused no change on a photographic plate on which it rested for 36 hours.

In Urology.—An outstanding advance in the field of diagnostic urology within the past few years has been the employment of radiopaque chemical substances administered intravenously and capable of producing x-ray demonstrations of the urinary tract during their physiological elimination. One of the earliest substances utilized was uroselectan (see below), and modifications of this compound with sundry trade names attached have appeared from time to time. Abrodil, iopax, skioldan and neo-skioldan (di-iodopyridon-N-acetic acid diethanolamine) are names familiar to those working in this branch of medicine. At first glance, it would appear that so simple a procedure must promptly displace retrograde pyelography with its attendant cystoscopic discomfort, but this is by no means the case. Rather, the 2 methods are complementary to each other.

K Kornblum (Am J Roentgenol 28 1 (July) 1932) discusses his experiences with *intravenous urography* in the Hospital of the University of Pennsylvania.

The technic employed in making the x-ray examination is as follows. The patient receives $1\frac{1}{2}$ oz (45 cc) of *castor oil* or 2 teaspoonfuls of *compound licorice powder* on the previous evening and comes to the x-ray laboratory at 8.30 the following morning. The abdomen is then fluoroscoped to ascertain if the preparation of the patient has been satisfactory. If so, a single 14 x 17 film of the urinary tract is exposed. The dye is then injected intravenously and a second film exposed 15 minutes after the injection, the patient being in the supine position. A third film is made after a lapse of 5 minutes, but this time a compression bag is employed upon the anterior abdominal wall. Another film is then exposed, but with the patient in the erect posture. Two more films are next made with the patient again supine; one with, and one without, the compression bag. These two exposures are made 45 minutes after the

injection of the dye. Finally, an 8 x 10 film is made of each kidney separately. The object of employing compression is to retard the flow of the excreted dye down the ureters and thus to improve the shadow of the upper portions of these channels as well as of the pelves.



Fig 3—Patient had the left kidney removed several years ago. Dense and unusually well-filled pelvis on right indicative of hyperfunction. Enlargement of pelvis and kidney result of compensatory hypertrophy. Film made without compression (Karl Kornblum Am J Roentgenol)

Kornblum emphasizes the following points in connection with intravenous urography in general: the dense shadows routinely obtained in retrograde pyelography must not be expected when employing the intravenous method, as

the kidneys excrete opaque substances in a concentration that does not exceed 5 per cent. A "good" shadow of a renal pelvis is not an indication of excellent excretory power on the part of the kidney. It frequently is found when this power is decidedly impaired. Absence of dye in the pelvis and ureter is the result of absence of the kidney, permanent loss of function, temporary loss of function, which appears to be more common than would be expected. Complete and persistent filling of the entire length of the adult ureter with dye is diagnostic of obstruction in its vesical extremity. In children, this rule does not hold. The roentgenogram made in the erect posture is valuable in demonstrating nephroptosis but is of little or no value for the purpose of showing morphological changes in the urinary tract, as the excreted dye gravitates into the bladder almost as fast as excreted when the patient occupies the standing position.

Writing on *intravenous urography*, W. F. Braasch (Col. Papers Mayo Clinic, 23:378, 1931) states that he has found it of value chiefly in visualizing the pelves of the ureters in those cases where there is a contraindication to cystoscopy with ureteral catheterization. This type of case he encounters in increasing numbers. He now feels that, as a test of kidney function, this method ranks high, but notes that occasional reflex inhibition of renal elimination of the dye may be misleading. As to the reliability of intravenous urography in determining operation, Braasch believes that when this examination reveals definite surgical disease on one side and a normal kidney on the other, then additional data are superfluous. This is particularly true in cases of **nephrolithiasis** and **hydronephrosis**. The great-

est usefulness of the test probably lies in the demonstration of a normal pelvis, of hydronephrosis, and of otherwise indefinite shadows. It has proved most disappointing in the visualization of the minor deformities produced by tuberculosis, tumors, polycystic kidney and pyelonephritis.

Angiography.—H. E. Pearse, Jr. and S. L. Warren (Ann Surg 94:1094 (Dec) 1931) relate their experiences in angiography, or the x-ray demonstration of peripheral blood-vessels in the living patient. They employ *methiodol* (*skiodan*) in concentrations sufficiently low to be noninjurious to the vessel walls as determined by injections into the arteries of lower animals.

A 40 per cent solution of methiodol is sterilized by boiling and injected into the artery supplying the part to be studied. A 50 c.c. syringe is employed and 25 c.c. of the solution run in. After exposing a film of the area involved, the remaining 25 c.c. is injected and a record film taken while the solution is entering the vessel. Seven cases are reported, in 3 the extremity was amputated with no discoverable evidence of vascular injury by the dye.

Arteriography.—R. dos Santos, C. Lamas, and J. Pereira Caldas (Bull. et mém. Soc. nat. de chir. 58:635 (May 7) 1932) introduced arteriography in 1929, using *sodium iodide* as the contrast medium. This proved to be injurious to the endothelial lining of the vessels and was replaced by *thorotrast*, which was free from this objection and showed itself particularly valuable in the demonstration of **aneurisms**. Dos Santos injects 10 to 20 c.c. (2½ to 5 drams) under a pressure of 15 to 20 Kg. and makes stereoroentgenograms of the part involved. This procedure reveals the nature of an aneurism and its relation

to the affected vessel, also the degree of permeability of the sac and the condition of the collateral circulation. Arteriography is valuable in confirming successful vessel suture and in differen-

1160 (Sept) 1931) discusses 26 cases of metastasis to bone from cancer of the breast and uterus, 20 from the former and 6 from the latter. In every case the patient had had surgery or irradiation



Fig 4—Aneurism of popliteal artery. Arteriography with thorotrast 2 days before operation (Santos, Lamas and Caldas. Bull et mém. Soc nat de chir, from Surg Gynec Obst)

tiating tumors from osteomyelitis. New vascular formations in neoplasms may be strikingly shown.

THERAPEUTIC INDICATIONS.—Breast, Carcinoma Of.—
METASTASES—Treatment—G Meldolesi (Radiol Med 18.615 (May);

prior to the appearance of the bone lesion. Nineteen of these cases received *x-ray* treatment directed to the metastasis with relief of pain and marked general improvement in all but 2. One case was alive 4 years after treatment. Three cases showed pronounced de-

crease in the bone tumors and the formation of osteosclerotic tissue, though they succumbed later to other metastases. The x-ray technic was characterized by a small current (1 M A), a high tension (180 K V), and a heavy filter (0.7 mm Cu and 2 mm Al)

TECHNIC—Two distinct methods of applying x-rays to the spinal region are described, each of which has been variously modified. The first of these, known as "*radicular*" therapy, was introduced by Bordier in the treatment for poliomyelitis and is directed to the spinal



Fig 5—Same as in Fig 4. Arteriography 8 days after Matas operation. First stage in development of collateral circulation. (Santos, Lamas and Caldas. Bull et mém Soc nat de chir, from Surg Gynec Obst)

Prolonged exposures were given with the production of an intense erythema. This is considered necessary in carrying out the procedure.

In Dermatology.—Harry Foerster (Arch Dermat and Syph 25 256 (Feb) 1932) has employed x-rays to the spinal region in the treatment of various dermatological conditions with commendable results.

cord and its roots. As modified by Pautrier in the treatment for lichen planus, it has become known as the *Strasbourg technic*. As first employed by Pautrier, it consisted in dividing the spinal region into 5 fields from the first dorsal to the fifth lumbar vertebra. A 5-mm. aluminum filter was employed, and a dose of 4 Holzknecht units was directed perpendicularly to each field.

Usually only 1 treatment was applied (According to the interpretation of Hirsch and Holzkecht, a dose of 4 Holzkecht units with a 1 mm aluminum filter equals approximately 30 per cent of the unit skin dose, and a dose of from

4 or 5 fields Zimmern and Cottenot employed a dose of from 1 to $1\frac{1}{2}$ Holzkecht units, through a 3-mm aluminum filter for 5 doses at daily intervals, directed to the spinal cord and its nerve roots Pautrier subsequently adopted



Fig 6—Same case as in Figs 4 and 5
Marked development of collateral circulation
(nat de chir , from Surg Gynec Obst)

Arteriography 2 months after Matas operation
(Santos, Lamas and Caldas Bull et mem Soc

3 to 4 Holzkecht units with a 3 mm aluminum filter equals from 30 to 40 per cent of the unit skin dose

Hufschmitt modified the Bordier technic, irradiating perpendicularly from the fifth cervical to the first lumbar vertebra through a 5-mm aluminum filter for a dosage of 3 Holzkecht units to each of

the Bordier method of dividing the spinal region into 8 fields, 4 on each side, and irradiating obliquely toward the midline at an angle of 45° Each field received a dose of 3 Holzkecht units through 5 mm of aluminum Schoenhof modified the Bordier technic, irradiating either the dorsal or lumbar

region, or the entire spine, by a cross-fire method. He used a filter of 0.5 mm of zinc and 1 mm of aluminum, delivering one-third erythema dose to each field, which was repeated in from 6 to 8 weeks and again in 2 months, if necessary. The fields measured 6 to 20 cm each, the voltage used was 100 kilovolts and the focal skin distance 30 cm. Only the segments of the cord concerned in the nerve distribution to the areas of involved skin were irradiated. Schoenhof obtained good results with this technic after he had failed when using from 0.5 to 3 mm of aluminum.

The "sympathetic" technic was introduced by Gouin, who employed unfiltered x-rays and directed them to a superior or principal sympathetic field and an inferior or accessory field. The first field was located in the interscapular area and centered at the fourth dorsal vertebra, and the second was in the dorsolumbar region and centered at the twelfth dorsal vertebra. In cases of acute lichen planus, unfiltered x-rays were employed in a dose of from 4 to 5 Holzkecht units, with a 12 inch (30 cm) point spark gap, and a 7 Benoist ray. In some cases the treatment was confined to a single exposure directed to the interscapular field. Gouin's usual method was to apply a single dose to the principal field and a second similar dose in 2 or 3 weeks to the accessory field. Treatments were repeated only when necessary and then in from 3 to 6 weeks in a single dose of 4 Holzkecht units through a 1 mm aluminum filter. In chronic cases a 1 or 2 mm aluminum filter was employed, and in the presence of oral lesions a 3 or 4 mm aluminum filter, in a dose of 3 or 4 Holzkecht units. In cases of resistant oral lesions the cervical region was also irradiated, employing a filter of 2 or 3 mm. of

aluminum and a dose of 3 Holzkecht units.

Louste, Levy-Franckel and Juster have expressed a preference for a dosage of 6 Holzkecht units through 3 mm of aluminum directed to each of the 2 spinal sympathetic fields. Neumark and Krynski exposed the sympathetic fields to from 3 to 4 mm of aluminum, at a target skin distance of from 25 to 30 cm, with a 28 to 30 cm spark gap and a 2.5 ma current. From 3 to 7 exposures were given monthly, depending on the indications. Nijkerk modified the Gouin technic by cross-firing small fields and employing fractional dosage on successive days for a total of 5 Holzkecht units. Driver used the superficial unfiltered method with from one-half to five-eighths of an erythema dose to the interscapular and dorsolumbar regions, and the filtered method with the same dosage and to the same fields through 3 mm of aluminum. With unfiltered x-rays he used 100 kilovolts and with filtered x-rays 113 kilovolts. From 1 to 3 treatments were given at intervals of from 2 to 4 weeks.

In the series of cases reported by Foerster (*loc cit*) the interscapular and dorsolumbar fields of Gouin were chosen, each field measuring approximately 10 to 20 cm. The central rays were directed to the fourth and twelfth dorsal vertebrae. One-half erythema dose was delivered through a 3 mm aluminum filter at 124 kilovolts by sphere gap measurement, with a 5 ma current and at a target skin distance of 12 inches. The Coolidge tubes used had been standardized for erythema dosage at these settings by spectrometric calculations. Single treatments were usually given, some were repeated at intervals of 3 weeks and others after longer periods.

UNTOWARD EFFECTS—X-ray therapy of the spinal region is associated with certain hazards and with occasional annoying manifestations and, more rarely, dangerous sequelæ. The technical risks that accompany any form of x-ray therapy must be noted. To this must be added the errors of judgment in determining the amount of frequency of irradiations in individual cases and the possibility of late sequelæ, owing to cumulative dosage affecting the skin, the hematopoietic tissues of the irradiated spinal area, the small blood-vessels of the cord and its coverings and the nerve tissues.

INDICATIONS—A study of x-ray irradiation of the spinal region leads to the conclusion that this form of therapy is most satisfactory in **acute or subacute generalized lichen planus**, and that it is of considerable value in chronic generalized cases of this disease. When definite improvement is not observed after 2 treatments, the author considers it advisable to employ other measures, either alone or in conjunction with additional spinal irradiation. In **dermatitis herpetiformis** considerable benefit and, in some instances, recovery may be expected from this method of treatment. It appears that in this disease repeated spinal treatments are required. The method is of definite value in some cases of **scleroderma**. In the management of **chronic generalized eczema** and **neurodermatitis**, spinal irradiation is useful. In the **post-eruptive neuralgia of herpes zoster** this method of treatment is of distinct benefit, and it may shorten the course or the intensity of the zoster eruption.

RAYNAUD'S DISEASE.—PATHOGENESIS.—At the meeting of the New England Heart Association,

November 4, 1931, Sir Thomas Lewis presented a brief summary of his theory as to the mechanism of Raynaud's disease. An abstract of Lewis' original article on this subject has been published in collaboration with W. J. Kerr (*New England J. Med.* 206:1192 (June 9) 1932). These workers found that "in the milder cases the arteries and arterioles of the fingers are healthy and capable of full expansion throughout their length. In the severer cases, the vessels are unquestionably capable of very considerable expansion, but full expansion cannot always be shown. The defect in expansion appears especially in fingers in which there has been distinct loss of substance and to be particularly prominent in vessels supplying the tips of the fingers in the region where the loss of substance has actually occurred." In the more severe cases, paralysis of the vasoconstrictor nerves by complete anesthetization (*a*) "does not prevent the vessels of the fingers from being subsequently thrown into a complete obstructive spasm by a local application of cold; (*b*) if the vessels of the finger are already and spontaneously in a state of full spasm when the vasomotor paralysis takes effect, the paralysis does not greatly relieve this spasm, it produces only a little relaxation of the vessels from their complete closure, a relaxation that is insufficient to raise the temperature of the skin, . . . (*c*) the onset of vasomotor paralysis *does* affect the degree of preëxisting spasm, and *does* tend to prevent the occurrence of spasm not as yet established . . . The statement, that a vasomotor impulse does not determine the abnormal condition of spasm is not intended to convey the idea that the vasomotor impulse contributes nothing to the tone of the vessels as it exists

The amount of constriction in the vessels at a given instant will depend upon the vasomotor tone and upon local influences, these will combine and act together. Remove one or the other and the vessels will relax. The fact that anesthetization of the vasomotor nerves causes relaxation of the vessels manifestly means that the vessels were in receipt of vasomotor impulses, but does not implicate the vasomotor nerves as exerting an abnormal influence. Because in certain cases the fingers or toes fail to exhibit attacks of cyanosis subsequent to sympathetic denervation, it may be tempting to conclude that these nerves are responsible for the abnormal element of spasm in the vessels. The conclusion, nevertheless, is fallacious. The abnormal element remains, all that has happened is that a tendency towards vasodilatation has been established by the denervation, and this has concealed what was previously evident. In searching for the determining cause of spasm, we must review the several possibilities and ascertain whether the abnormality is local or lies at a distance; it will not be found in both. Our conclusion is that the cause is a local one."

Lewis' final conclusion is that the abnormal element in the reaction to cold, in cases of the type they have defined, is a "direct reaction," due to a peculiar condition of the vessel wall locally; that it is not the result of reflex through the vasomotor nerves.

S L Simpson, G E Brown and A W Adson (*Arch Neurol and Psychiat* 26 687 (Oct) 1931) studied the behavior of the extremities of 9 cases of Raynaud's disease, after complete interruption of the vasomotor nerves by local anesthetization or by cervicothoracic sympathectomy, to decide between the theory of vasomotor neurosis (Ray-

naud) and that of local abnormality of the digital arteries. Three of the 9 cases were severe. In all of the severe cases, whether or not ulceration of the fingers was present, interruption of the nerve fibers alleviated but did not prevent spasm of the digital arteries. In 5 of the 6 cases which were early and mild, interruption of the nerve fibers alleviated and prevented spasm of the digital arteries. In the one exceptional case, a case of 9 months' duration, arterial spasm could be elicited by local application of cold combined with pressure. Apparently, in this case local hyperexcitability of the small vessels persisted to some degree after operation.

The authors feel that it has been shown conclusively by their study that in early and relatively mild, uncomplicated, typical cases of Raynaud's disease, the abnormality lies in the sympathetic nervous system, and that in the severe and complicated cases there is abnormality both of the sympathetic nervous system and of the digital arteries. In the latter cases, it seems probable that the abnormality of the arteries is a late effect (a secondary complication) of the disease. In their experience, lumbar sympathetic ganglionectomy never failed to abolish all manifestations of the disease in the feet, probably due to the certainty with which the anatomic structures can be attacked and to the fact that the feet are much better protected from secondary complications. On the other hand, cervicothoracic sympathetic ganglionectomy occasionally did fail to give complete relief because of failure to section all the sympathetic fibers.

Like Raynaud, the authors observed that many of the patients showed a general nervous instability. "The fact that an attack of blanching or cyanosis of

the extremities may follow immediately some slight emotional disturbance caused by fright, excitement or surprise, suggests hypersensitivity of the sympathetic nervous system. Of course it is possible that the digital arteries are already in a state of abnormal contraction and that the vasomotor effect is just sufficient to complete the spasm, acting merely as an additional and nonessential factor. Against this theory is the fact that such psychic attacks may occur in a warm atmosphere when the initial temperature of the fingers is fairly high.

"It is also possible that a normal person would manifest an equal degree of sympathetic nervous activity under similar circumstances, but that in Raynaud's disease the digital arteries are hypersensitive to such central stimuli. This would constitute an extension of Lewis' hypothesis, of which, however, he does not appear to approve. We, too, are unable to accept this theory in uncomplicated cases, but for different reasons. Apart from the clinical impression that these patients display exaggerated response to emotional stimuli, it is significant that in several of our cases the psychic attack and cyanosis are associated with simultaneous excessive perspiration of the hands. Unless both abnormality of the digital arteries and abnormality of the sweat glands are postulated, it seems necessary to conclude that in cases of Raynaud's disease there is primary hyperexcitability of the sympathetic nervous system."

Whatever view is taken of the cause of the abnormality of the digital artery in complicated cases of the disease, the authors cannot conceive on what grounds it could be cited as an etiologic agent or as the essential primary mechanism. Any theory of the primary mechanism of Raynaud's disease must be applicable

both to early and to late cases of the disease and to both hands and feet. In their minds, the sum total of the evidence furnishes an additional confirmation of Raynaud's original view that there is a primary abnormality of the sympathetic nervous system.

SYMPTOMS.—E. V. Allen and G. E. Brown (Am J M Sc 183:187 (Feb) 1932) report a study of 150 cases of Raynaud's disease, finding a uniformity of symptomatology: (1) gangrene or trophic changes limited largely to the skin; (2) bilateral symmetrical involvement; (3) no evidence of occlusion of peripheral vessels; (4) intermittent attacks of color changes existing over a long period of time before the appearance of trophic changes.

The disease occurs much more frequently in the female sex and the age period of choice would seem to be the third decade. When it occurs in younger individuals, it is associated with definite nervous instability. In body type, the patients tend to the asthenic. In the cases studied, blood-pressure findings were within normal ranges for the most part (81 per cent). Anemia of moderate degree was present in only a small percentage; 37 patients in the group had various other ailments such as "chronic exhaustion, neurosis, excessive nervousness and hysteria, or were victims of constitutional biologic inferiority."

DIAGNOSIS.—The main differential diagnosis lies between peripheral vascular disease such as thromboangitis obliterans and Raynaud's, according to Allen and Brown, which is not particularly difficult.

In a later publication, Allen and Brown (J. A. M. A. 99:1472 (Oct. 29) 1932) add 2 more diagnostic criteria, *viz*, (5) the disease must have

been present for a minimal of 2 years, and (6) there must be no evidence of disease to which it could be secondary. They feel that pain is a minimal symptom—in contrast to thromboangitis obliterans and other conditions. The factor of a neurotic element in the etiology is stressed and Lewis' theory of "local fault" of the vessels is viewed with doubt, except perhaps as an end-result. Atypical types of Raynaud's are often associated with scleroderma or arthritis (51 out of 204 cases examined) and the authors narrowed their studies down to 147 "typical" cases.

TREATMENT.—Distinct benefit from a high-calcium-high-vitamine régime has been reported by A. R. Bernheim and I. M. London (Am Heart J 7:588 (June) 1932) in 4 cases of spasmodic vascular disease of the Raynaud type characterized by hypersensitiveness to cold. None of the cases was of the severity originally noted by Raynaud. They did not show permanent, irreversible changes such as gangrene or spontaneous amputation, which probably indicates that spasm was the essential basis of their symptomatology.

The schedule of the procedure was, as follows:

For 2 weeks: A daily diet of milk, 1 quart (1 liter), viosterol, 30 drops, tomato juice, 16 oz (480 cc), orange juice, 8 oz (240 cc), and lactose, $\frac{1}{2}$ oz (15 cc).

The viosterol may be taken in 3 doses of 10 drops each, or in two doses of 15 drops each.

The tomato juice is given for its high vitamine content, primarily for vitamine B, which favorably affects intestinal tonicity. If tomato juice is not well tolerated, other substances rich in vitamine B may be substituted.

The next 2 weeks: If results are not satisfactory, calcium salts are substituted for the milk. Either calcium lactate or calcium gluconate may be used.

Dosage of calcium lactate: 80 grains (5.2 Gm.) daily in 2 doses of 40 grains (2.6 Gm.)

each, 40 grains (2.6 Gm.) 1 hour before breakfast and 40 grains (2.6 Gm.) 4 hours after supper. If the second dose interferes with bedtime, it may be taken 4 hours after luncheon, and supper should not be eaten within less than 1 hour after taking the dose.

Dosage of calcium gluconate: 150 to 180 grains (10 to 12 Gm.), either as a powder or tablet, plain or effervescent, the time of administration being the same as for the lactate.

The time of administration of the calcium salts is very important, and only small amounts of water should be taken with the tablets. It has been shown that calcium is absorbed best in the interdigestive period and that when calcium is taken "3 times a day after meals," as it is so frequently prescribed, a minimum of absorption results and the therapy usually fails.

The next week: If there has been no improvement, calcium gluconate administered intramuscularly is added to the treatment. The dosage is 1 ampule (10 cc of a 10 per cent solution) daily, with or without parathormone, 20 units (10 cc).

The next week: If this has not been satisfactory, calcium gluconate or calcium chloride is given intravenously. The dosage is 1 ampule (10 cc of a 10 per cent solution).

The older literature contains repeated references to calcium as a therapeutic agent in Raynaud's disease. Bernheim and London are unable to explain fully the results obtained in their cases. "Possibly the action of calcium upon this type of vascular spasm caused by cold is analogous or even related to its action in certain so-called allergic conditions characterized by spasm, *e g*, bronchial asthma, in which favorable results are often obtained. The analogy becomes even more striking from a consideration of the observations of Thomas Lewis, in cases of Raynaud's disease, that apparently there exists in these subjects a true specific idiosyncrasy or hypersensitiveness to cold which manifests itself through the spasmodic arrest of circulation in the affected parts, independently of the vasomotor nerves."

Surgical Treatment.—J C White (New England J Med 206 1198 (June 9) 1932) reports the immediate and late effects of **sympathetic neurectomy** on 6 cases of typical Raynaud's disease. In each case, resection of the 2 upper dorsal ganglia, or of the second to fourth lumbar ganglia, brought about an immediate paralysis of sympathetic tonus. The vasomotor paralysis following lumbar sympathectomy has been complete and permanent; whereas, a recurrence of sympathetic nerve function has followed the dorsal operation in 2 of the 5 cases reported here and in 5 others operated by other members of the same clinic (Peripheral Vascular Clinic of the Massachusetts General Hospital). In the latter cases, sympathetic nerve activity reappeared at the end of 6 months, accompanied by the color changes, pain, coldness and ulceration in the tips of the fingers characteristic of Raynaud's disease. Blocking the regenerated vasoconstrictor fibers again by novocaine or by neurectomy brought about a second disappearance of the manifestations of the disease. It seems, therefore, that resection of the first and second dorsal sympathetic ganglia alone is insufficient to cause a permanent vasomotor paralysis of the arm. In the author's more recent cases, the operation has been extended upwards to include the inferior cervical ganglion, following the procedure of A W Adson (Am J Surg 11 227 (Feb) 1931), and results as permanent as those in the lower extremity are being anticipated.

RETINA. —DETACHMENT.—

Etiology.—It is pointed out by C A Clapp (Ann Int Med 5 1313 (Apr) 1932) that detachments of the retina may be produced in 4 different ways

(1) *trauma*, traumatic detachments usually improve and sometimes recover completely by **rest in bed**; (2) an extensive exudate of the choroid in acute *toxemia of pregnancy* may push the retina away from the choroid. These detachments usually become completely reattached as the general condition improves. Detachment also occurs in *acute nephritis* not associated with pregnancy. In these cases the prognosis as to life is grave. A *tumor of the choroid* may produce a detachment in the same way; (3) *bands of connective tissue in the vitreous* may pull the retina away from the choroid. This usually follows hemorrhage in the vitreous. The prognosis is bad, (4) detachments due to *unknown causes*. This type occurs frequently.

Leber and Gonin explain that in retinal detachments there exists a localized lesion of the retina which becomes atrophic and sometimes cystic and finally tears. The vitreous then penetrates this rent and separates the retina from the choroid. Clapp has found this condition in an eye with retinal detachment which he sectioned.

Prognosis.—From his experimental study of the production and treatment of retinal detachment in animals, L L Mayer (Arch Ophth 7 499 (Apr) 1932) concludes (1) that the retinal tear is not the only factor in maintaining detachment of the retina, and (2) that although the use of the cautery results in reattachment, it is accompanied by marked destruction of tissue in the neighborhood of the wound.

L Weekers and R Hubin (Arch d'ophth 49 65 (Feb) 1932) state that in cases of detachment of the retina, if reattachment does occur, the recovery of function depends upon the length of time the detachment has existed and

upon the underlying cause of the detachment. The amount of visual recovery depends not upon the extent of reattachment but upon the degenerative changes which have taken place in the retina. They report 2 cases with spontaneous reattachment, 1 regained fair vision, the other did not.

Treatment.—W F Hardy (Am J. Ophth 15 37 (Jan) 1932) expresses the opinion that the successful outcome of the **Gonin operation** is dependent on the consistency of the vitreous. When thick, it interferes with the coaptation of the edges of the tear, when "fluid," as in myopia, operation for detachment offers better chances of success. Elschning, as well as K Lindner, obtained satisfactory results from the Gonin operation, especially in myopia of high degree.

DIABETES.—The ocular findings in diabetic patients are reported by H C Shepardson and J W Crawford (California and West Med 35 111 (Aug) 1931) as follows: a retinitis of a somewhat characteristic pattern was found in 23 per cent of the patients, all of whom had renal impairment and all but 4 generalized arteriosclerosis; retinitis was not found in uncomplicated diabetes; lenticular opacities occurred in 54 per cent of the patients but were not different from the usual changes associated with senility, early onset of presbyopia

in diabetes is only a very occasional finding, in 17 per cent there was glaucoma simplex. From their examinations of 58 diabetic patients, the writers conclude that almost all diseases of the eye found in association with diabetes result from the systemic complications of that disease.

GLIOMA.—A case of glioma exophytum is reported by R M Cutino and R Lloyd (Am. J. Ophth 15 425 (May) 1932). At the age of 6 years defective vision, detachment of the retina and the presence of 2 small circumscribed white woolly patches were observed in this case. The tumor was not visible behind the detached retina and transillumination was not interfered with until a few months later. They point out that there are 3 varieties of glioma: (1) *glioma exophytum* or *tuberosum*, which originates on the outer surface of the retina and spreads out between the retina and choroid causing early detachment of the retina, (2) *glioma diffusum* or *planum* in which the detached retina is thickened throughout its entire extent; (3) *glioma endophytum* which occurs 3 times as often as the exophytum type. Glioma endophytum arises from the inner layers of the retina and grows into the vitreous. The retina usually remains attached to the choroid. This type is usually referred to as glioma of the retina.

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SALYRGAN. —UNTOWARD EFFECTS.—A case of *sudden death* with salyrgan was reported by I J Wolf and H D Bongiorno (Canad. M. A J 25 73 (July) 1931), who administered 6 doses of the drug intravenously in a case of nephrosis in a boy 4 years

of age. Each administration was usually followed by an augmented rise in the afternoon temperature and malaise. The resulting urinary output was poor and the injection preceding the fatal administration was followed by chills, fever, a morbilliform rash, anorexia and

malaise The sixth dose caused sudden death Although the dislodgement of an embolus is possible as the cause of death, at no time was there any evidence of infiltration or thrombosis at the site of injection, and the authors believe that the death was an anaphylactoid one As concerns "speed shock," the salyrgan was injected as slowly at the fatal administration as at any other An autopsy was not performed

Severe toxic effects were noted by C T Andrews (Lancet 2 131 (July 18) 1931) during the administration of salyrgan intravenously to a patient, 22 years of age, with congestive heart disease The dose administered, which was the initial one in this case, was 0.5 c.c. (8 minims) of a 10 per cent solution diluted to 10 c.c. (2½ drams) with sterile distilled water and the time taken for the intravenous injection was about 4 minutes Before the full dose had been given the patient complained of headache Fifteen minutes later she suddenly lost consciousness, and the upper limbs and face became involved in a clonic spasm of about 30 seconds' duration The features became blanched during the seizure, the pulse was rapid and almost imperceptible, and the heart sounds during the attack were almost inaudible The clonic spasm was followed by vomiting, which was repeated several times in the next hour In the 12 hours following the injection, the patient had 5 similar seizures Pallor was a marked feature of each, there was a temporary loss of consciousness and each attack was followed by vomiting No diuresis followed the injection; whereas the average daily output of urine for the 4 days preceding the injection was 33 ounces, the average for the following 4 days was 24 ounces The blood-urea on the day following the seizures was 37

mg per 100 c.c. A urea-concentration test gave normal findings The author remarks that he can state definitely that there is no possibility of an error having been made in the dilution of the salyrgan solution The possibility of coincident uremic manifestations is also definitely excluded by the blood-urea and the urea-concentration test, and the assumption is that the patient possessed a marked degree of susceptibility to the drug, because the dose employed was much smaller than the average dose in general use

In a study of the comparative toxicity of merbaphen (novasurol) and salyrgan, B I Johnstone (J Pharmacol and Exper Therapy 42 107 (May) 1931) made observations of the effects of these two drugs injected intravenously into rabbits Eighty-four animals were used, 42 being given merbaphen (novasurol) and an equal number salyrgan In each instance a 10 per cent solution of the drug was used, after being further diluted 1:10 with sterile normal physiological sodium chloride solution In each animal the dose was carefully measured and estimated per kilogram of body weight

As estimated from the immediate lethal dose, the lethal dose and a comparison of the extent of acute parenchymatous kidney damage produced in the rabbit by equal toxic doses, it is shown that merbaphen (novasurol) is slightly more toxic than salyrgan The author states, however, that this difference is not nearly as great as one would be led to expect from clinical reports The degeneration produced in the kidney of the rabbit by toxic doses of salyrgan is similar to that produced by merbaphen (novasurol) and by other mercurial compounds in common use, according to the histologic studies made

Therapeutics.—In a discussion of the use of salyrgan in the treatment of heart failure, D E Bedford (Proc Roy Soc Med., Sect Therap and Pharmac 24 1 (Feb) 1931) states that the drug has proven to be of definite value in cases of gross congestive failure of recent onset, as an adjunct to digitalis, in cases of chronic failure when hepatic enlargement and edema persist in spite of full digitalization, and in cases of adherent pericardium with ascites, or of pericardial effusion with edema of superior vena caval distribution. In the treatment of severe cardiac failure by salyrgan, the following routine has been adopted by the author

1 Salyrgan is given intravenously, first dose 1 c c (16 minims), followed by 2 c c ($\frac{1}{2}$ dram) doses at intervals of 4 days. The salyrgan solution should be diluted to 10 c c ($2\frac{1}{2}$ drams) with sterile distilled water or saline, and all alcohol should be removed from the syringe. The injection should be given very slowly, taking several minutes altogether, and, after removing the needle from the vein, the arm should be elevated above heart level at once, so as to empty the vein and thus prevent thrombosis.

2 Ammonium chloride is given by mouth in doses of 15 to 30 grains (1 to 2 Gm) 3 times daily

3 Routine digitalis treatment should not be modified and full digitalization should be rapidly induced and maintained

4 Fluid restriction must be rigid. Usually the total fluid intake should be reduced to 20 to 30 ounces (600 to 900 c c) in 24 hours, and should never exceed 35 ounces (1050 c c)

5 If hydrothorax is present—and unilateral right-sided hydrothorax is almost the rule in cases of gross heart

failure requiring salyrgan—paracentesis should be performed, not more than 35 to 40 ounces (1050 to 1200 c c) of fluid being removed slowly at a single operation. It is not necessary to tap ascites

6 The patient should be weighed daily, as body weight is the best guide in judging the progress of dehydration treatment. Used in this way, the author states that there is almost always a prompt diuresis of 100 to 200 ounces (3000 to 6000 c c) after the first doses, and a fall in weight of 14 to 20 pounds (6.3 to 9 Kg) in the first week and up to 40 to 50 pounds (18.1 to 22.8 Kg) in a few weeks. The diuresis begins in 1 to 2 hours and may last 48 hours, but it is usually over in 24 hours

H B Sprague and A Graybiel (New England J Med 204 154 (Jan 22) 1931) report their results in 60 cases in which salyrgan was administered intravenously. Forty-six patients had cardiac disease with congestive failure, 8, cirrhosis of the liver; 4, cancer; and 1 each nephrosis and ovarian cyst. In spite of the fact that one-third of these patients were in the terminal stages of chronic disease, diuresis was secured by the use of salyrgan in 80 per cent of the cases. This diuresis exceeded twice the fluid intake in 55 per cent. From their experience with salyrgan, the authors confirm the opinion of other observers that the drug is an active and safe diuretic, of particular value in the treatment of congestive heart failure with edema, of ascites from various causes, and in some cases may prove useful in treating malignant effusions.

It is emphasized by the authors that the drug should be used early in the therapy of these conditions and not reserved as a drug of last resort. As a diuretic for repeated use, it is useful in

its freedom from serious toxicity and almost complete absence of gastrointestinal irritation. Its effectiveness can often be increased by combining it with acid salts, such as ammonium chloride or nitrate, or with other diuretics and digitalis.

SCARLET FEVER.—SYNONYMS.—The terms *scarlatina* and *scarlet rash*, according to F W Laidlaw (New York State J Med 32 601 (May 15) 1932), are often confusing to the laity. While they are synonyms for scarlet fever, the terms are often used in connection with mild cases of scarlet fever or for the purpose of allaying the fears of the parents in more severe cases. The idea is conveyed or encouraged that *scarlatina* or scarlet rash is not so likely to be transferred to others as scarlet fever. It is advisable, consequently, to use the term *scarlet fever*.

ETIOLOGY.—Specific Cause.—L E Shinn (J Infect Dis 49 281 (Oct) 1931) has made an electrophoretic study of the sterile filtrate of cultures of the streptococci of scarlet fever and erysipelas. By the study of the amount of nitrogen migrating into an agar electrode under the influence of a potential gradient from samples of a standard medium and the filtrates from cultures of the streptococci from scarlet fever and erysipelas, adjusted to varying hydrogen ion concentration, he has been able to show that different effects are produced by the growth of these organisms. These changes are exemplified by the increase and decrease in the amounts of cationic and anionic nitrogen. The author concludes that the growth of the organisms of scarlet fever and erysipelas in a standard medium produce similar but distinctly different changes in the electronitrogen

picture. The changes in buffer action produced by the growth of these organisms are different and show a relationship to the changes in the values of the migratory nitrogen.

Predisposing Causes.—The presence of *tonsils*, according to G. Nemhauser (J Immunol 22:315 (Mar.) 1932) does not seem to be a significant factor in predisposing to scarlet fever. In a group of 600 patients with scarlet fever, 122, or 20 per cent, had previously been tonsillectomized. The expected number for the community should have been 144 or 24 per cent of the patients. Therefore, a slight but statistically insignificant beneficial effect of tonsillectomy on the incidence of the disease occurred. The degree of severity of the disease was about the same in the 2 groups. Of the tonsillectomized children, 43.9 per cent developed complications as compared with 46.9 per cent. of the children whose tonsils had not been removed.

TRANSMISSION.—A W Williams and C R Gurley (J Bact 23:241 (Mar) 1932) have concluded that *milk-borne* epidemics of septic sore throat and of scarlet fever may be caused respectively by one or several agglutination types of *hemolytic streptococci*. When scarlet fever predominates, usually the epidemic strain belongs to one of the common scarlet fever strains. When septic sore throat predominates, the epidemic strains may be one of several agglutination types respectively. Two strains belonging to the latter group have been demonstrated in these studies and have been tentatively called epidemicus agglutinative Type I and epidemicus agglutinative Type II.

G E Reed and H J Tellier (Canad M A J 25 584 (Nov) 1931) observed a clinical relationship between

scarlet fever, erysipelas and septic sore throat occurring in an epidemic form. When a pasteurizing plant worker with otitis media was removed, all 3 epidemics subsided.

PORTAL OF ENTRY.—E I Savrimovich (Arch biol nauk 31 468, 1932, J A M A 98 2033 (June 4) 1932) reported 3 cases of scarlet fever in children characterized by clinical findings pointing to a rapid localization of the infection in the lungs. In each case, death occurred in the first week of the illness. The primary manifestation at necropsy was a necrosis in the lung and the bronchial lymph nodes, while changes were not observed in the throat or vessels.

The *convalescent carrier* has long been recognized as playing an important part in the transmission of scarlet fever. Among scarlet fever patients, J L Jones (South. M J 25 416 (Apr) 1932) has found that very few throats become negative for hemolytic streptococci within less than 4 weeks, the majority remaining positive for 5 to 6 weeks. In some instances the chronic carrier state developed.

The importance of the *contact carrier* in the transmission of scarlet fever has come to be recognized only in recent years. During an epidemic of scarlet fever at Berea College in 1929, Jones states that nose and throat cultures for *hemolytic streptococci* were obtained for the entire group of students. It was found that 25.7 per cent of those who were not ill with scarlet fever had positive cultures. During a subsequent epidemic in another community, 38 per cent. of the cultures were positive. As a control group, cultures were obtained at Eastern State Normal School. Only 6 per cent. of the total group harbored hemolytic streptococci.

TYPES.—According to A I Love (Illinois M J 61 238 (Mar) 1932), the characteristic scarlet fever has changed in recent years and a *mild, atypical form* of the disease is very prevalent. Careful examination and prolonged observation is often necessary to diagnose these cases.

Abortive scarlatina of the pruriginous type is considered by P Héritier (Arch de méd d enf 34 553 (Sept) 1931) to be a rare form of the disease. The author describes a case in a girl, aged 4 years, following a second degree burn. Pruritus was intense. The case proceeded like one of the malignant types, although the dominating symptom throughout was the uncontrollable itching.

Puerperal scarlet fever, in the experience of Cornella Downs (Am J Obst and Gynec 23 735, 1932), is a puerperal infection with a streptococcus whose exotoxin is capable of producing an erythematous eruption. The particular streptococcus may invade the blood stream and produce the clinical course of *puerperal sepsis* with a high mortality rate. On the other hand, the infection may be confined to the uterus, the constitutional reaction being slight and the associated erythematous eruption being due to the absorption of the exotoxins. The prognosis in this group of cases is excellent.

According to the author, the rôle of the *Streptococcus scarlatinae* in the production of puerperal infections, associated with erythema, cannot be definitely established. However, a streptococcus was obtained from the blood stream of a patient with puerperal sepsis associated with an erythema which could not be differentiated from that of scarlet fever. The exotoxin of the organism produced a characteristic re-

action when injected into Dick positive persons. The exotoxin could also be neutralized by scarlet fever antitoxin.

COMPLICATIONS.—Hemorrhage—T. A. Shtein (Arch Biol Nauk 31 577, 1932, J A M A 98 2033 (June 4) 1932) observed 15 cases of hemorrhage from the blood-vessels of the neck during scarlet fever. A diffuse phlegmon originated in the suppurating lymph nodes and then spread to the blood-vessels in contact with the abscessed region. Ten of the hemorrhages were arterial in origin, 5 were venous. Hemorrhages of this type, according to the author, occur from the fifteenth to the thirty-fourth day of the illness.

Nephritis—The initial mildness or severity of scarlet fever, states F. V. G. Scholes (M J Australia 2 703 (Dec 5) 1931), gives no indication as to the likelihood of subsequent nephritis. The fact that mild scarlatina is more likely to be missed and the subjects not kept in bed is counterbalanced by the fact that in severe scarlatina there is more kidney damage and consequently increased liability to nephritis later on. Commonly, the appearance of the nephritis is heralded by a slight but definite rise in temperature and definite swelling of the lymph nodes.

TREATMENT.—(a) Prophylaxis.—Isolation of the scarlet fever patient, according to J. E. Gordon (J A M A 98 519 (Feb 13) 1932), is largely a group procedure, with requirements governing the disease rather than the individual concerned. Incomplete information on the epidemiology of scarlet fever is one outstanding reason for this empirical practice. Better cooperation in reporting and maintaining isolation can logically be expected if restrictions are minimal and adjusted to

individual requirements. A. B. Marfan (*Ibid* 99 773 (Aug 27) 1932) also expressed the opinion that the isolation regulations are too rigid and that its duration should be determined in each case. He thinks the minimal period should be 25 days.

Gordon has studied the efficiency of 2 methods for release of patients after an attack of scarlet fever. One method represents accepted practice—an isolation period of 28 days for uncomplicated cases and release of patients with complications thereafter on clinical recovery, with a maximum restriction of 56 days. The second method included the same minimum requirements for uncomplicated cases, but patients with complications were released when 2 successive negative cultures for hemolytic streptococci were obtained from affected parts. The infecting case rate was found to be the same in the 2 conditions. This method materially reduced the average period of isolation. The gain, of course, was entirely in the group with complications.

Patients with certain complications were safely released before complete recovery. Certain complications are more likely than others to disseminate the infection. In order, rhinitis and sinusitis rank first, followed by secondary throat infections and suppurative otitis media. The latter complication under bacteriologic control is no more a source of danger than the simple, uncomplicated case.

Evidence also showed that patients of the older age groups could safely have been discharged earlier. During certain times of the year the secondary case rate was materially lower. The practicability of shorter periods of isolation during late spring and summer should be investigated further.

According to J L Jones (*loc cit*), very few scarlet fever patients have negative cultures for hemolytic streptococci within less than 4 weeks, a majority remaining positive for 5 or 6 weeks, and in some instances the chronic state develops. All cases of carriers are recultured at weekly intervals. In many instances, the culture from carriers becomes negative in 1 week, a majority clearing in 3 weeks. In practically all carriers failing to clear in 4 or 5 weeks, some pathologic condition can be found in the nose, throat, or sinuses. A majority of these become chronic carriers and only become negative upon removal of the diseased parts. The time required for both cases and carriers to free themselves of scarlet fever organisms is largely proportional to the degree of normalcy of the nose, throat and sinuses. W L Bradford (*Am J Dis Child* 44 279 (Aug) 1932), however, found that the rate of disappearance of the organisms from the throat was about equal in the children with tonsils and in those whose tonsils had been removed sometime previous to the attack of scarlet fever. The tonsillectomized child had a few less organisms throughout convalescence than did the child of the other group. At the end of 30 days, 17 per cent of the tonsillectomized group and 22 per cent of the children with tonsils had hemolytic streptococci in the throat in excess of 5 per cent.

While in the majority of instances, according to Jones, a test for specificity of the hemolytic streptococcus is not necessary, under certain circumstances it may be of great importance. Such a differentiation, according to the author, can be accomplished by testing the organism for specific toxin production.

On the other hand, A Lichtenstein (*Acta pediat* 12 100, 1931) believes

that the presence or absence of hemolytic streptococci in the throats at the time of release of the patient is, with present methods, a poor guide of infectiousness and should not be relied on as an indication that the minimal isolation period may be curtailed in individual cases.

Relapses, according to A Lichtenstein (*Ibid*), account for many return cases. Scholes makes the same implication. Individual isolation, or isolation in pairs during the course of the disease, appears to have a beneficial influence on the frequency of return cases, apparently through its effect on the suppression of relapses. Relapses were found to spread through open wards from bed to bed, as a rule, to patients whose Dick test remained positive late in the course of the illness.

Vaccino-therapy, if continued until a negative Dick reaction was obtained, appeared to protect the patient against relapse.

Active Immunization—G F and G R H Dick (*J A M A* 98 1436 (Apr 23) 1932) attempted to immunize human beings by the ingestion of the scarlatinal toxin. The undiluted toxin was given by mouth at least 2 hours before meals in increasing doses of from 4 cc to 16 cc, each cubic centimeter containing 50,000 skin test doses. The toxin was given once a day on successive days. The fact that when administered by mouth an average total dose of 8, 315, 789 skin doses immunized 73.1 per cent, while a total of 135, 500 skin test doses injected subcutaneously immunized 93 per cent, indicates that toxin administered by mouth is less efficient than the same toxin injected subcutaneously.

Toxoid—Reed and Tellier (*loc cit*) injected scarlet fever toxoid in divided doses, totalling 375 cc. Immunity to

this treatment developed in 87.5 per cent of the patients to at least 5 skin-test doses. Scarlet fever toxin in 4 doses, totaling 2000 skin-test doses, produced a similar degree of immunity in 86.5 per cent of the patients.

Control of Epidemics in Institutions

—In an institution when 35 children had contracted scarlet fever and when an epidemic was on the increase, Brügger (München med Wchnschr 78 1082 (June 26) 1931) immunized 220 children and 15 adults against the disease. The first injection for active immunization was given at the same time as the antitoxin for passive immunization. The subsequent injections for active immunization were given at weekly intervals. One mild case of scarlet fever occurred 14 days after immunization and 3 other mild cases developed 3 months after the treatment. A change from positive to negative Dick reactions occurred in only 61 per cent of the patients.

M. L. Blatt and M. L. Dale (J. A. M. A 98 1437 (Apr 23) 1932), without closing St. Vincent's Infant and Maternity Hospital, an institution with an annual turnover of 300 per cent, found it was possible to stop an outbreak of scarlet fever while the incidence of the disease was still high outside the institution. Taking cultures of the throats, masking adult hemolytic streptococci carriers, isolating the infants with positive throat cultures, and using an antiseptic in the nose and throat of those harboring hemolytic streptococci, making Dick tests on all persons, passively immunizing Dick positive contacts and actively immunizing all Dick positive patients, were the means employed.

Complication of Passive Immunization—A. Gordon (J. A. M. A 98.1625

(May 7) 1932) reported 3 cases of *musculospiral palsy* and 1 case of *facial palsy* following the prophylactic administration of scarlet fever antitoxin. The paralysis lasted 4 and 5 weeks, respectively. The author states that paralyses from prophylactic injection of serum are shorter in duration than those from therapeutic injections.

(b) Therapeutic Treatment.

SERUM THERAPY—Scholes (*loc cit*) states that if serum is given *early*, whether the case is severe or mild, the immediate issue is, with rare exceptions, over in a few days at most. If serum is not given early and the enanthem has been severe, local complications, such as otitis media and cervical adenitis are to be looked for. If the enanthem has not been severe, most children escape all complications at this stage.

The serum which has been distributed in New York State, according to A. B. Wadsworth (J. A. M. A 99.204 (July 16) 1932), is monovalent, prepared by the immunization of horses with a single strain of the streptococcus (Dochey N. Y. 5). The serum is not concentrated and yet it contains an antitoxin potency of 800 units per c.c.

Reports have been obtained on the use of the serum in many forms of streptococcus infection, such as scarlet fever, erysipelas, etc. The results show that the antiserum is most effective in cases predominately toxemic, whether mild or severe. The general impression that the serum has no effect on complications may be questioned, Wadsworth states, since the dose given has so often been inadequate. Doses of 10,000 and 20,000 units should be given and repeated in 12 to 24 hours.

Antitoxin administration to scarlet fever patients, according to G. Nemhauser (J. Immunol 22 315 (May)

1932), does not interfere with the development of antitoxic immunity in convalescence. The fear that no immunity will develop is not a contraindication to the use of serum.

Serum Complications.—L. W. Hunt (J A M A 99 909 (Sept) 1932) observed that serum reactions occurred in 28.1 per cent of patients who received diphtheria antitoxin, in 22.7 per cent of those who received scarlet fever antitoxin, and in 81.8 per cent of the patients receiving antimeningococcic serum. The occurrence of serum reactions after the injection of diphtheria and scarlet fever antitoxin is determined in part by the susceptibility of the individual, by the toxic properties of the serum, and in the largest measure by the total quantity of the serum injected. The frequency of the reaction did not vary widely in the various age groups.

ISOLATION OF PATIENT.—Strong attempts should be made, according to Scholes, to protect small children from infection in convalescence by fresh strains of cocci. Isolating patients in separate cubicles is desirable, grouping of children in pairs in small rooms is better. If medical supervision and proper home conditions are available, the early discharge and subsequent treatment and isolation at home of a large proportion of the patients should be given serious consideration.

SINUS DISEASE.—A general survey of the literature for 1932 on the various phases of the paranasal sinuses brings confusion to the mind of a competent rhinologist were he to make an attempt at rationalization from the conflicting reports published throughout the world.

J. H. Childrey and H. E. Essex (Arch Otolaryng 14 564 (Nov)

1931) have shown that very little absorption takes place from sinus mucous membranes, contrary to usual high absorptive powers of other mucous membranes. Various potent poisons were instilled into the frontal sinus, insignificant reactions resulting compared to those found when these same drugs were applied to nasal, oral or other mucous membranes. This applies, however, only to intact mucoperiosteal membranes. Infected and inflamed mucous membranes were not experimented with.

PHYSIOLOGY.—A. Hilding (Arch Otolaryng 15 92 (Jan) 1932, Ann Otol Rhinol and Laryng 41 52 (Mar) 1932) calls attention to the fact that ciliary action and a protective, moving film of mucin over the surface are the chief mechanical factors involved in the drainage and defense of the nasal mucosa. The drainage, as activated by the cilia, is rapid, powerful and effective. Gravity plays a minor part. Traction, on the other hand, exerted on the film of mucin, as on a net, is an important factor in drainage. A complete exchange of the film of secretion over the surface takes place every 10 or 15 minutes in the more active regions in the nose, and about once an hour in the inactive regions. The drainage is directed backward with a strong tendency to flow toward the best protected areas, *viz*, the middle and inferior meatuses. The inactive anterior third of the nose drains largely through these meatuses by means of traction. The sinuses (as represented by the frontal sinus of the dog) have definite and extremely efficient drainage that is spiral in direction. With these points in mind, the necessity of changing the point of view of treatment of nasal conditions from an anatomic to a physiologic one becomes apparent.

BACTERIOLOGY OF NOSE AND THROAT.—Attention is called by W C Noble, Jr and D H Brainard (J Lab and Clin Med 17 573 (Mar) 1932) to the fact that many bacterial species are to be found in the nasal passages and throat, and that the same, or apparently the same, species occur on both the healthy and diseased mucous membrane. It is difficult, therefore, in the absence of a definite lesion, to appraise satisfactorily the clinical significance of many of the species encountered in a bacteriologic examination. This is especially true of the streptococci, whether green, indifferent or hemolytic, the pneumococci, staphylococci, Gram-negative cocci, and hemoglobinophilic bacilli. If the hemolytic streptococci is considered as an example, it must be remembered that they constitute a large group of many strains which differ greatly in their pathogenicity and virulence, and that while certain strains may give rise to scarlet fever or to septic sore throat, others may be innocuous. The finding of hemolytic streptococci, therefore, is not necessarily significant, but the finding of a particular strain may be of great significance. Unfortunately, the demonstration of a particular pathogenic strain is not always easy and usually is not practical in routine examinations. The rôle of the anerobic bacteria as incitants of colds and influenza is unknown, they would appear to be part of the normal flora and of little if any pathogenicity, but additional experimental evidence may change these views.

Recent work has again directed attention to the probability that a filtrable virus is the primary cause of certain respiratory infections, these infections prepare the way for the secondary complications, which may be brought about

by many of the common bacteria harbored in the upper respiratory tract.

Biochemical studies of sinus disease by S Israel and H O Nicholas (J A M A 97 1453 (Nov 14) 1931) show no characteristic or consistent chemical observations that are significant of bone, tissue or blood changes in sinus disease which could be looked upon as having a bearing on its diagnosis, prognosis or treatment.

PATHOLOGY.—Attention is called by K W Amano (Arch Otolaryng 15 681 (May) 1932) to the fact that the *x-ray examination* of the nasal sinuses following the administration of *iodized oil* by the displacement method furnishes additional information as to whether the drainage from the ostia is satisfactory or whether the sinuses or cells are filled with thickened membrane or pus. Negative results after the administration of iodized oil, however, do not always exclude the possibility of disease. The practical value of the opaque displacement method in the diagnosis and treatment fluctuates according to nasal complications, such as hypertrophied turbinates, especially the middle turbinates, and polyp. The removal of these obstructions should be advised before the final x-ray examination by the displacement method. The results of the administration of iodized oil by the Proetz method only in his supine position are more accurate in the case of the ethmoid and sphenoid sinuses than in the case of the maxillary and frontal sinuses. For the maxillary sinuses, the iodized oil should be injected by puncture through the inferior meatus or by cannula through the natural ostium. The advanced prone or knee-chest position of the displacement method described by the author is recommended, after the Proetz method with the supine

position is practiced, in order to give better results in the administration of iodized oil, especially into the frontal sinuses and the anterior ethmoid cells

SINUSITIS AND ASTHMA.—

The question as to whether sinusitis may produce asthma or whether the two are expressions of a generalized hypersensitivity or hematologic imbalance, has ever been a greatly discussed problem. There is sufficient data corroborating each theory, yet neither fulfills Koch's postulates, which would make either a separate clinical entity. Wilmer and Schenck (College of Physicians of Philadelphia, Sect on Otol. and Laryng (Feb) 1932) reported on the rôle of sinusitis in the production of asthma leaning toward support of the allergic mode of treatment, with a large percentage of cures resulting from their bacterin therapy.

H. P. Schenck and R. A. Kern (in another article) (J Allergy, 6 296 (Mar) 1932) report the results of the Caldwell-Luc operation as performed in 35 cases of bronchial asthma. The percentage of favorable results obtained bore no relation to the apparent etiology (allergy or infection), to the previous duration of the asthma, or to the age of the patient. A comparison of these results with those of other intranasal operative procedures shows a greater percentage of improvement after the radical operation. In a majority of instances this improvement is only temporary. The authors believe that the radical operation should be reserved for those cases of antrum infection which have failed to yield to more conservative measures.

D. C. Jarvis has been insisting for years, more so recently (Am. Triological Soc (Jan) 1932, Tr Am Laryng. Rhin and Otol A. (May) 1932), that

these allergic phenomena are based on a generalized alkalosis, corroborated by Alden, and the use of nitrohydrochloric acid advocated. No proof of blood pH concentrations to substantiate these reports are given, but results are quoted from empirical therapeutics. Yet successes are met with as a result of dietary and acid management.

In the opinion of H. L. Baum (Ann Otol Rhin and Laryng 41 143 (Mar) 1932), nasal and sinus disease is primarily not an etiologic factor in the causation of asthma. Asthma and nasal and sinus disease are often concomitant manifestations of the same condition in 2 different localities in the same patient, both dependent on the same underlying etiologic factors. Nasal and sinus operations should not be performed primarily for the cure of asthma, only such surgery being done as would be indicated by the same observations in the upper respiratory tract of the nonasthmatic patient. Allergic manifestations in the nose and sinuses should serve as warning finger posts, pointing the way to danger, and the patient should be so advised and should have his state of hypersensitization studied and treated—not only as a therapeutic measure directed to the cure of nasal symptoms, but as a prophylactic measure calculated to prevent more serious consequences later.

COMPLICATIONS.—As to nasal sinusitis in relation to *lobar pneumonia*, C. M. Eadie (M J Australia 1 263 (Feb 20) 1932) reports the results of 103 postmortem examinations of the nasal accessory sinuses. The cases were not selected in any way, the sinus examinations were carried out on patients who had died in the wards of the Melbourne Hospital and who came to necropsy. In few cases had a record

been made of any examination of the nasal sinuses, carried out during the final illness. The diagnosis of the condition of the sinuses was formed from their macroscopic appearance. It would appear, after reviewing these cases, that there is a definite association between acute infection of the maxillary antrum and lobar pneumonia, and that the inflammatory reaction of the lung may be caused in many cases by the entrance into the lung by way of the larynx of pathologic organisms and their toxins that have developed in the maxillary antrum. The investigation seems to justify the following conclusions:

In all cases of lobar pneumonia, the maxillary antrum should be investigated, and this is most satisfactorily done by suction and disinfection of their contents. The earlier this is done, the better will be the prognosis when the antrums are infected. The improvement in general symptoms and signs that may occur once these cavities are treated in this way is remarkable. Also, it is noted how often a single "wash out" seems sufficient to clear the suppurative condition of the sinus. At the first suction pure pus may be obtained, and on repetition of this procedure 10 days later the contents may appear free of pus. In regard to pneumonia in association with influenza, this procedure is particularly advocated. When cerebral symptoms arise in the course of lobar pneumonia, the sphenoidal sinuses should be similarly dealt with. The suction and disinfection of the sinuses can be done with the minimal disturbance to the patient. He does not require to be moved in his bed. A local anesthetic is all that is required.

The cases of *osteomyelitis of the skull* that are found to complicate acute and chronic disease of the nasal accessory

sinuses are discussed by A. O. Wilensky (Arch Otolaryng 15 805 (June) 1932). He considers only cases due to infection by the ordinary pyogenic bacteria. The clinical picture presented by the majority of these cases is similar. The infection that leads to the fatal result is usually postoperative and occurs within 2 or 3 days after an operation for disease of the nasal accessory sinuses. The diploe of the frontal bone is invaded by the organisms, and an osteomyelitis is set up. The infection spreads, on the one hand, through the outer table, giving rise to subperiosteal abscesses beneath the scalp; it passes inward, on the other hand, and may subsequently give rise to extradural or subdural abscess, general meningitis, cerebral abscess or a thrombosis of the longitudinal or other large sinuses. The dura mater is affected in practically all cases, and the pachymeningitis may remain localized a long time. Thrombosis occurs chiefly in the lateral or longitudinal sinuses. The invasion of a large venous sinus is often manifested by emboli with distant metastases. Pneumonia and bronchopneumonia occur frequently. It is generally easy to make a diagnosis of osteomyelitis in the bones near the orbit or ear. However, it is often difficult to recognize the diffuse form because the general symptoms are often more pronounced and may mask the local symptoms. A diagnosis can be made before operation from a careful study of the symptoms that accompany the sinusitis or mastoiditis.

It is necessary to operate when the osteomyelitis becomes evident, and the operation should be as extensive as possible. The cranial bones should be resected beyond the limits of the lesion. If the wound continues to granulate and if the temperature remains high,

sequestrums are present and they must be removed as completely as possible. There is a large mortality. The patient succumbs to one or more of these conditions with or without the manifestations of a general blood infection, as evidenced by the presence or absence of a positive blood culture, after a varying number of weeks or months ranging to one or more years.

TREATMENT.—The surgical issues which confront the physician fluctuate yearly between conservatism and radicalism. However, certain new forms of therapy which have vacillated since the days of Hippocrates, have come to the front today, sponsored by increasing numbers. Three groups are evident.

1 **Immunological Agents.**—The best example is the bacteriophage, which has proven its value particularly in staphylococcic infections. A. A. Janson and R. L. Larsen (Illinois M. J. 60:334 (Oct) 1931) described the laboratory technic involved in making the "phage," emphasizing the importance of testing the action of any particular "phage" to the infectious material present. They maintain that if a stock bacteriophage does not clear up a cultured specimen from the area in question, neither will it suffice *in vivo*. In this case, autogenous bacteriophaginous material should be used, "stepped-up" until it shows definite antibactericidal properties to the specific culture from the patient under treatment. The medical profession is already being subjected to stock preparations of bacteriophage solutions, jellies and ointments for the treatment of most infections including sinusitis, and it behooves the scientific rhinologist to inquire clearly, yet avoid the enthusiasm of panacea salesmen.

2 **Dietary and Endocrine Therapy.**—W. Mithoefer (J. M. A. Georgia

21 335 (Sept) 1932) calls attention to the rôle hypothyroidism plays in lowering the resistance of a potential sinusitis cell. E. V. Ullmann (Northwest Med 31 240 (May) 1932) considers an evaluation of the dietary status of patients, as evidenced by acidity or alkalinity expressed by urine reaction to litmus, very essential in the management particularly of chronic sinus infections. He further advocates this investigation where repeated operations have been unsuccessfully performed, where there exists no closed empyema and where organic disease is eliminated. Control and regulation of diet has resulted in a large percentage of relief, if not cure, from symptoms. It appears, from this report and from reports by D. C. Jarvis (Ann. Otol. Rhin. and Laryng 39 584 (June) 1930), that high acid conditions exist most frequently resulting from excessive carbohydrate and sodium chloride intake. Although the pH of the blood is not changed, it remaining a biologic constant, called the acid-base equilibrium, nor the relationship of free and fixed carbonic acid, yet acid and basic food, biologically, can change their absolute quantities so that the alkaline reserves will be decreased in acid and increased in alkaline diets. Ullmann classifies foods as to acid characteristics into 3 groups: (1) value of taste, (2) chemical value of ash, (3) biologic effect value, this third being all-important in the evaluation of the effect of any diet.

3 **Physiotherapy.**—These adjuncts to rational sinus management are certainly of value physiologically and of no little consequence psychologically, though the greatest care must be exercised against allowing the latter to assume major importance to the physician. E. P. Fowler (Arch. Phys. Therapy

13 581 (Oct) 1932) states that diathermy, ionization, x-ray, ultraviolet, supra- and ultra-rays, and all the newer developments in physical therapy may be used in otolaryngology unless etiology, pathology and therapeutic requirements, etc., make them impotent or inadvisable

Radium and Nasal Polypi.—J C Scal (Arch Otolaryng 16 199 (Aug) 1932) claims that radium, 125 to 300 millicurie hours, repeated at the end of the week, and employed after reaction of surgical sinus procedure has subsided, resulted in complete eradication of polyps in all but 3 cases in a series of over 100

Frontal Sinus Operation.—The principal preventable causes of failure of the external operation on the frontal sinuses in a group of cases studied by C M Anderson (Arch Otolaryng 15 739 (May) 1932) were (1) incomplete operation, (2) failure to obliterate completely the sinus cavity in the Killian type of operation, (3) in the Lynch type of operation, the collapse of the soft parts and contracture of the scar closing off the nasofrontal duct; (4) failure to provide adequate room for proper drainage through the nose, (5) failure to maintain the nasofrontal duct long enough after the operation, (6) too early surgical intervention in acute infections, and (7) failure to remove completely all the ethmoid and fronto-ethmoid cells connected with the frontal sinus

The author considers that the selection of the type of operation to be employed in any given case is extremely important and should be suited to the particular problem presented. If there has been considerable destruction of the outer wall of the sinus, changing the contour of the face is not a serious con-

sideration, and the patient must be assured of a relatively high percentage of cures, in such cases, the Killian type of operation is employed. If the normal contour of the forehead must be preserved even at a greater risk of not obtaining an entirely satisfactory result, some type of operation which preserves the anterior wall of the frontal sinus should be selected. The bony walls should be preserved sufficiently to prevent collapse of the soft parts, and the nasofrontal duct should be maintained by means of a drainage tube for a long time. The two-stage operation, in which the intranasal portion of the operation is done a considerable time prior to the external operation, has proved of great value

CHRONIC FRONTAL SINUSITIS.—Leonhard (J Laryng. and Otol Edinburgh 47 369 (June) 1932) calls attention to the fact that the frontal sinuses of which the x-rays show a true transverse diameter of less than 3 cm, are rarely subject to a chronic inflammation. The lateral stasigenic (stasis producing) factors are apparently most prevalent in the left sinus, the medial factors undoubtedly predominating in the right sinus. The greater tendency of the right frontal sinus to chronic disease estimated directly is confirmed by the author's data. These data rest not only on the comparison of all the stasigenic factors of all the sinuses of one side together with those of the other, but also on the fact that the total number of deep pockets predominates on the right. The author believes that if rhinologists who have seen a great deal of chronic frontal sinusitis would decide to publish the exact number of their well authenticated cases (right and left side separately) in the form of a simple personal statistic, and if those who have at

their disposal a great number of anatomic preparations of this sinus would examine for the presence of stasigenic factors (the two sides separately), this interesting question could definitely be settled. It is particularly interesting because the comparison in definite cases of x-ray data with the intrasinus statistics is often able to show the correct and shortest way to appropriate treatment.

MAXILLARY SINUS.—NATURAL ORIFICE OF.—An attempt was made by M. C. Myerson (Arch Otolaryng 15 716 (May) 1932) to enter the normal ostium in 170 maxillary sinuses, 138, or 81 per cent, were successfully entered, and 32, or 19 per cent, could not be entered. The Pierce cannula and the author's modification of this instrument were used. It should be remembered that the ostium lies horizontally, obliquely and vertically. In this series, 34 were horizontal, 6 oblique and 98 vertical. The proximity of the middle turbinate to the lateral wall does not appear to interfere with the passage of a cannula into the maxillary ostium. There may be an occasional exception, in this study there was 1 in 138 instances. The height of prominence of the uncinate and the depth of the infundibulum do not always interfere with the successful passage of the cannula. The angle (bulla-uncinate angle) formed by the posterior upward curve of the bulla and the posterior downward curve of the uncinate is the most constant guide to the location of the ostium. On the basis of his observations, Myerson concludes that irrigation of the maxillary sinus through its ostium is a feasible procedure in a sufficiently large percentage of cases to make it worthy of a trial.

Local ultraviolet irradiations, applied directly to the larynx in tuber-

culous infections, has been endorsed by Wessley (Hajek Klinik, Vienna). Its benefits to the nasal mucosa depend upon accessibility of the nasal cavities, and then only as the smallest part of rational rhinological management.

Lastly, electrocoagulation of turbinates, in place of electrocauterization is questionable, because it has been shown that fibroblastic activity is greater following the use of cautery. Where strong bands of scar tissue are desirable to reduce hyperplastic and hypertrophic turbinates by means of linear streaking with caustic agents, the electrocautery would therefore seem more advisable.

MALIGNANT TUMORS.—Attention is called by N. E. Lacy (Arch Otolaryng 15 530 (Apr) 1932) to the fact that nasal *polypi* are associated with malignant growths frequently enough to oblige the rhinologist to consider this possibility in every case of nasal *polypi* that he encounters. The author reports a case which bears out the theory that a nasal polypus is not transformed into a malignant tumor, but is a result of a primary malignant process in the mucous membrane. It is particularly important that the tissue surrounding the attachment of the polypus should be carefully examined as well as that all the *polypi* be removed. The examination of one of a large number of *polypi* that have been removed does not constitute a pathologic examination. The amount of radium required cannot be determined without a pathologist's report of the tissue removed.

DIAGNOSIS.—Two cases of *carcinoma of the sphenoid sinuses* with invasion of the cranial cavity are reported by C. Davison and S. Kahr (Arch Otolaryng 14 16 (July) 1931). The neurologic signs were due to direct extension of the tumor into the middle and

posterior fossæ compressing practically all the cranial nerves. The sella turcica was invaded in 1 case and spared in the other. Meningeal signs were absent. No retrobulbar signs were evident. The authors state that in cases in which sinusitis is suspected and are not relieved by operation, it is advisable to have repeated x-rays taken of the sella and posterior sinuses.

TREATMENT.—Radiosensitive tumors, such as transitional cell carcinoma or lymphoepithelioma, melt away with the use of radium or x-ray, but it is also true that recurrence is the rule with even more severe extension than before until, finally, no reaction follows the use of these rays and the patient succumbs to his carcinomatous disease. On the other side, slow-growing, late-metastasizing, squamous cell carcinomas and sarcomas have given the best results where radical, extensive surgical eradication has been effected, followed by x-ray and radium. When no recurrence follows, after a sufficient length of time, plastic surgery has been successfully instituted in arriving at a fairly satisfactory cosmetic appearance.

SINUS THROMBOSIS.—C E Benjamins (Monatschr f Ohrenh 65 1489 (Dec) 1931) reports a case of *otogenous thrombosis of the cavernous sinus* which was followed by recovery. After discussing the sources, symptoms and therapy of thrombosis of the cavernous sinus, the author describes a case from his own practice which he thinks interesting because it clearly shows the course of this disease. A boy, aged 15, came to the hospital because of an acute inflammation of the ear. Operation on the ear revealed a cholesteatoma of the middle ear and thrombosis of the transverse sinus, which was spreading into

the emissary vein of the mastoid and the cervical muscle. Twelve days after the operation, while the infectious foci opened during operation were still draining and the newly-developing abscesses of the neck were being treated, the first symptoms of cavernous thrombosis, paralysis of the eye muscles, appeared. Paralysis of the pupils appeared first and was followed by paralysis of the exterior muscles of the eye and protrusion of the eyeball. There was no stasis in the fundus oculi, but later there appeared cyanosis of the eyelids, thickened veins and other symptoms of congestion. The ocular symptoms were followed by a number of abscesses, indicating a spread of the thrombosis in all directions from a central focus, in this case the 2 cavernous sinuses. The symptoms of the spreading thrombosis included orbital abscesses of both eyes, detachment of the left retina, a parotid abscess on the same side and a parapharyngeal abscess. Incision, withdrawal of pus, daily cleansing of the abscesses with hydrogen dioxide and the introduction of cigaret drains resulted in a gradual healing of all abscesses and recovery of the patient. The author points out that, while the patient had the usual septic symptoms, cerebral symptoms were lacking.

TREATMENT.—According to O M Rott (Arch Otolaryng 14.272 (Sept) 1931), the only indication to be met in the treatment for *lateral sinus infection* is the prompt removal of the infected area, whether that area is in the mastoid cells, the sinus plate, the wall of the sinus or inside the lumen of the sinus. The author revives a moot question that ligation of the jugular vein does not prevent absorption of toxins and bacteria into the general circulation and hence is a superfluous procedure.

After reviewing the literature, Rott feels that ligation of the jugular vein should be reserved for definite infection in the vein, and then should be accompanied by resection. He states that in the matter of ligation of the jugular vein, undue significance is apt to be attached to it merely because of its time-honored position in the various procedures advocated for the control of infection of the lateral sinuses. However, simply because a procedure has been carried on for years is no reason why subsequent data may not cause it to be discarded. Unceasing change is a universal law, and he thinks that the time will come when the procedure of ligation of the jugular vein will not be so universally practiced as it is today, just as today it is not practiced so universally as it was 20 years ago. The change will come slowly, because just now, especially when septic symptoms continue after operation on the sinus, the surgeon is afraid not to ligate. After ligation, there is a feeling of security in knowing that all that has been advocated has been done, even though death supervenes, whereas, if ligation is not performed, the criticisms of colleagues who might think differently about the method of procedure adopted must be faced. However, if those who do not believe it best to ligate have the courage of their convictions and operate on the sinus early, bolstering up the resistance of the patient by all the means at their disposal, including frequent transfusions of blood, and if they fight just a little harder to justify their belief, the mortality rate will not be higher when ligation is not performed than when it is resorted to.

SMALLPOX (VARIOLA).—
INCIDENCE.—In the United States, during the year 1930 there were 46,712

cases of smallpox reported (Pub Health Rep 47 837 (Apr 8) 1932). This is about one-half the number reported 10 years previously (1920). The type of infection was mild however, and the mortality rates very low. In many of the countries of continental Europe, the decline of smallpox during the last 10 years has been remarkable. In Italy, for instance, the number has dropped from more than 26,000 in 1910 to 2 in 1930. In England and Wales, on the other hand, where there are no compulsory vaccination laws, the numbers have steadily increased from 280 in 1920 to 11,839 in 1930. There, as in the United States, the smallpox infections have been mild in the great majority of instances.

Variations in the severity of smallpox in various localities have given rise to many theories of a difference in the types of disease. Other names, such as alastrim, amass, and varioloid, have been given to the milder infections to distinguish them from the classical smallpox. The subject of differentiation between the types has been approached from a statistical viewpoint by C V Chapin and J Smith (J Prev Med 6 273 (July) 1932). Studies of the epidemics and of the morbidity and mortality rates of smallpox in the United States for the last 30 years indicated that the mild strain of the disease has been prevalent in extensive areas of this country, but there has been no tendency for the type to change permanently into one of more severe character. The classical severe smallpox has occurred at infrequent intervals in this country, but usually near the Mexican border, due to importations from the latter country. These figures indicated to the author the existence of 2 separate strains of the disease, each of which

tended to produce a separate disease and one a much more severe infection than the other. If an attenuation of the severe types was the cause of the milder form of the disease, the reverse should be true and it would seem probable that widespread epidemics of the mild smallpox would occasionally lead to an increase of virulence of the virus, this, however, has apparently been a very rare occurrence in the reports of the last 20 years.

DIAGNOSIS.—Mild forms of smallpox may often be confused with chicken-pox, secondary syphilitic lesions and other skin eruptions. Additional reports have been made recently of special laboratory methods of making a differential diagnosis. A modification of a technic previously employed has led to the development of a satisfactory *complement-fixation test* for smallpox by R. F. Parker and R. S. Muckenfuss (Proc. Soc. Exper. Biol. and Med. 29:483 (Jan.) 1932). Material collected from the skin lesions of 14 patients with smallpox gave positive tests in all but 2. In the latter 2 patients, the material had been obtained 12 and 14 days, respectively, after the appearance of the eruption. Seven patients with vaccination takes also had positive tests. Negative tests were obtained in all of a group of 10 control cases. The authors were of the opinion that this test could be applied in early infections to aid in the differential diagnosis.

SMALLPOX VACCINATION.

—TECHNIC.—The *intradermal* injection of smallpox vaccine has been used in recent years because it insures a "take" in a larger proportion of instances and reduces the incidence of secondary infections and other complications such as encephalitis.

The relationship between the *number or the size of vaccination scars* and the *degree of immunity* produced has been a subject of discussion for many years. The majority of writers agree with the above investigator that the larger and multiple "takes" produce a more complete and lasting immunity. The smaller, single "take" however, is usually thought to be sufficient in the great majority of instances. This opinion was held by S. F. Dudley and P. M. May (J. Hyg. 32:25 (Jan.) 1932). Among a group of 329 boys, 11 to 13 years of age, vaccinated 12 years after the first "take," there were as many "immune" reactions in those who had small scars as in those with larger ones. The immune reactions occurred more than twice as frequently among boys who had multiple scars as among those with only one.

M. Cohn (Med. Klin. 28:157 (Jan. 29) 1932) advised a reduction in the number of scarifications from 4, which is the number usually employed throughout central Europe, to 2, and that these be no longer than 2 mm. in length at the most. It was believed that this would reduce the severity of the reactions and the complications, although the immunity produced from such a procedure would probably not last long, and more frequent vaccination would be required.

POSTVACCINE ENCEPHALITIS.—One of the most frequent complications of vaccination in the last few years has been encephalitis. It has been the subject of numerous reports in the literature and one of the most striking features of the disease is its prevalence in certain countries and rarity in others. Postvaccinal encephalitis has been observed frequently in several of the northern European countries, but a late report from the Netherlands, by J.

Jitta (J A M A 98 831 (Mar 5) 1932, Netherlands correspondence) indicated a decline in incidence. Between the years 1924 and 1929, there were 189 cases of this complication or 1 for every 4656 persons immunized. From May, 1930, to May, 1931, there was no instance of postvaccinal encephalitis reported among some 19,000 patients who were vaccinated. In the Tyrol, however, an increase in postvaccinal encephalitis has been observed by V. Niederwieser (Jahrb f Kinderh 133 318 (Nov) 1931).

This complication of vaccination has been relatively infrequent in the United States, according to C. Armstrong (Pub Health Rep 47 1553 (July 22) 1932). Only 71 instances have been reported during the past 10 years and the greatest single epidemic occurred in the autumn of 1930. All but 2 of these cases occurred after a primary vaccination and in all but 1 patient a single insertion method had been employed. The mortality from this type of encephalitis has averaged about 42 per cent. in other countries and was 37 per cent. in the United States. The recommendations which were thought to minimize the danger from smallpox vaccination consist of (1) employment of a small, superficial insertion of the vaccine material with no subsequent dressing, and (2) vaccination in infancy. It has been noted that a preliminary immunization of mice against diphtheria resulted in an increased resistance to smallpox vaccination. It was suggested that this would be a feasible plan to follow in the immunization of infants, *i.e.*, to begin with diphtheria immunization and when immunity to that disease had developed (usually 2 to 3 months later), to proceed with the smallpox vaccination.

The *etiology* of the encephalitis is still

unknown although a great deal of interesting work has been done on the subject in the last few years, especially in the fields of animal experimentation. The ability of certain strains of vaccine virus to produce encephalitis in experimental animals and the consistent failure of other strains to do so, led to an investigation of that subject by R. Thompson and L. Buchbinder (J Immunol 22 267 (Apr) 1932). It was observed that strains of vaccine virus derived from the same parent strain differed in the type of the skin reactions which they produced, as well as in their ability to produce encephalitis. It was found that neither strain of vaccine virus immunized animals against a herpes infection, nor did the addition of poliomyelitis virus cause the mild strain of vaccine virus to become pathogenic for the brain. It was concluded, therefore, that neither the herpes nor the poliomyelitis virus was a contamination which led to the production of encephalitis. This, and other evidence, induced the authors to regard the cause of postvaccination encephalitis to be a special strain of vaccine virus.

In an investigation of the reasons for the affinity of vaccine virus for the brain, W. F. Winkler (Ztschr f Immunitat's forsch u exper Therap 73 185 (Dec 19) 1931) observed that a bacteriophage penetrated the hemato-encephalic barrier more readily in recently vaccinated animals. A paratyphus bacteriophage was injected intravenously into rabbits and after 6 to 20 hours, and again in 2 to 7 days, samples of blood and spinal fluid were taken from the animals and examined for bacteriophage. In healthy animals the bacteriophage usually disappeared from the blood by the end of 7 days and the very small amount which could be found

in the spinal fluid remained there but a short time afterwards. After vaccine was injected or applied to the skin or cornea by scratch methods, the bacteriophage was found to pass through more readily. Although animals vary in regard to the permeability of this hemato-encephalic barrier, it is possible that these experiments explain the incidence of encephalitis following vaccination for smallpox.

Treatment.—Several methods of prevention and treatment of vaccination encephalitis have been suggested. One *prophylactic measure* has been directed towards **purifying vaccine virus** by separating it from the cellular debris with which it is associated. Methods of centrifugation, filtration and diffusion which have been tried previously by other investigators, have proved to be more or less successful, according to C. A. Behrens and L. B. Morgan (J. Infect. Dis. 50:277 (Mar.) 1932). The latter writers employed an *isoelectric method* which consisted of treating the emulsified material with twenty-fifth normal *acetic acid*, centrifuging and pipetting off the clear liquid, and neutralizing with twenty-fifth normal *sodium bicarbonate solution*. Practically all the virus was found to be recovered in a purified form by this method. It had been demonstrated previously that the vaccine virus carried a negative electric charge, and with this in mind, the investigators tried another method of purification. Use was made of a negatively charged material which would repel the virus but carry down the cellular debris. An *aluminum gel* proved satisfactory for this purpose. It produced a coagulant which could be removed by centrifugation, leaving the virus in a clear liquid. Both methods of purification proved to be effective

with neurovirus but only the gel method was satisfactory with dermovirus.

Two types of vaccine virus were found to differ in the ability to pass through a certain kind of filter. S. P. Kramer (*Ibid.* 50:119 (Feb.) 1932) observed that the ordinary dermal vaccine virus did not pass through a basic filter made of gypsum and magnesium oxide, calcined at 1300° C. The filtrate did not produce symptoms of vaccinia in rabbits and consequently did not immunize them. A special testicular vaccine virus, however, could be filtered through this substance. This filtrate, inoculated in 7 or more doses of 1 cc each, made rabbits immune to vaccinia.

Attempts to *attenuate* or *inactivate vaccine virus* have not been very successful. J. O. W. Bland (J. Hyg. 32:55 (Jan.) 1932) inactivated 3 different samples of vaccine virus with heat, phenol and formaldehyde and tested their immunizing power in various animals. Guinea-pigs were protected fairly well by these materials, but rabbits yielded less readily. Generally speaking, the virus of the vaccine was too readily destroyed by these agents and the author did not believe any of the above methods were practical.

A *treatment* of vaccination complications, especially encephalitis, which has been as successful as any recently, has been the administration of **immune serum**, taken either from human patients who have recently recovered from a vaccination "take" or from animals which have recently recovered from large doses of vaccine. J. C. G. Ledingham, W. T. J. Morgan and G. F. Petrie (Brit. J. Exper. Path. 12:357 (Dec.) 1931) injected large doses of vaccine virus into a horse to hyperimmunize it and they observed a considerable increase in the antibodies formed in its

blood serum. These antibodies occurred in the greatest concentration in the euglobulin and pseudoglobulin fractions of the blood serum. By animal experimentation it was found that this serum neutralized vaccine virus. The authors believed that this immune horse serum would be valuable in the treatment of complications which arise in human patients following vaccination.

A similar experiment was conducted in India by C. G. Pandit, K. P. Menon and M. O. Sahib (Indian J. M. Research 19:1185 (Apr) 1932), who gave large doses of vaccine to buffaloes to produce a hyperimmunization. Monkeys could be protected from vaccinia by this serum when it was administered simultaneously with the cutaneous vaccination. If the protective serum was injected a short time after the animals had been vaccinated, the course of the vaccinia was attenuated. The serum afforded considerable protection to the animal against smallpox virus, even if the inoculation with the disease virus preceded the injection of serum by 24 hours. Human serum of patients, convalescent from smallpox, was found to contain a larger amount of protective antibodies than was present in any of the samples of buffalo serum.

It has been very desirable to determine the strength of immune serum in order to make a selection of the proper kind and amount for therapeutic purposes. Several such tests have been devised. The neutralization of the vaccine virus by immune serum is much more readily demonstrated in skin reactions than in intratesticular tests or intracerebral tests, according to R. W. Fairbrother (J. Path. and Bact. 35:35 (Jan) 1932). This neutralization reaction in the skin occurred irrespective of the time the vaccine virus and the

immune serum were allowed to react with each other *in vitro*. It was suggested that the skin itself might play some part in these intradermal tests and that possibly the immune serum stimulated the local tissue cells to a reaction against the virus. When the virus and immune serum were injected into the brain of animals, there was evidence of much less neutralizing action. In this instance, however, a mixture of the two materials which was allowed to stand for at least 4 hours *in vitro* before it was injected into the brains of the animals, caused an appreciable diminution of virus activity. The mechanism suggested to explain this reaction was that the virus becomes sensitized to the serum and was then more easily destroyed by the blood cells.

Another test for the potency of vaccinia immune serum is the "flocculation reaction," which occurs when smallpox virus is added to blood serum. This was suggested as an accurate test by J. Craigie and W. J. Tullock (Med. Research Council, Special Rep. Ser. No. 156, 1931; Am. J. Dis. Child. 43:467 (Feb) 1932). If the flocculation reaction occurred with serum in a high titer, the latter was found to have the power of conferring passive immunity to vaccinia. Injections of 1 c.c. of this immune serum per kilogram ($2\frac{1}{2}$ lb.) of body weight furnished protection against large doses of vaccine virus given intradermally, by scarification or by the intratesticular route.

SPLEEN. — SPLENOMEGALY.

—Personal experience with a large group of cases of splenomegaly accompanied by an acute febrile reaction has impressed I. Cohn (New Orleans M. and S. J. 85:15 (July) 1932) with the fact that they are rarely benefited by

splenectomy He believes those cases associated with lymph node enlargements (Hodgkin's disease, lymphatic leukemia, tuberculosis and syphilis) are not to be considered surgical cases Many types of secondary anemias are often treated without reference to the etiological factors, and an earlier investigation would frequently reveal more cases of splenic anemias Hemorrhagic purpura is curable in a spectacular way by splenectomy

GAUCHER'S DISEASE.—O Reiss and K Kato (Am J Dis Child 43 365 (Feb) 1932) report a study of 3 cases of Gaucher's disease from a family of 6 Japanese children living in California

It is described as a familial, chronic, constitutional nonhereditary disease of metabolism, characterized by the deposition of cerebroside kersin in certain cells of the reticulo-endothelial system, splenohepatomegaly without ascites, occasional lymphadenopathy, subicteric pigmentation of the exposed parts of the skin, thickening of the ocular conjunctiva, hemorrhagic diathesis, changes in the bone, a hypochromic type of anemia, slight early leukopenia, the frequent occurrence of thrombocytopenia and spastic irritative contractions and tremors of a central type

Roentgenographically, the femur displays the most characteristic punched-out changes The cortex in the middle of the bone is thin and there is a bilateral fulness or swelling just above the condyles

The first case reported by the authors was that of a little girl, 4 years of age, in whom the changes in the long bones were characteristic She lived to the age of 7 when she died The second case was that of a boy 3 years, also having splenomegaly and long bone changes,

who died at the age of 6 The third case was that of a child 15 months of age, in which intraperitoneal injections of whole blood were made weekly but the patient died in 5 weeks

TUBERCULOSIS.—In a study of tuberculosis of the spleen, E Greppi (Riv di pat e clin d tuberc 5 1025 (Dec 31) 1931) believes that in all probability tuberculous infections reach the spleen through the blood, the lymphatic centers being involved secondarily It is not impossible, according to the author, that the infection may be introduced by the lymphatic route reaching the hilus and capsule of the spleen and involving the surrounding peritoneum

Experimental works and observations upon human material have proven the ease with which tuberculous involvement of other structures and organs occur. The process usually assumes a diffuse sclerotic type rather than a specific nodular one In many instances the only preoperative *diagnosis* which may be made is splenomegaly, but the suspicion of a tuberculous involvement may be aroused where there is slight fever, pains and allergic reactions Although the disease may run a chronic course, the prognosis is serious Exacerbations take the form of cachexia or diffuse infection of the liver and lymph nodes.

RUPTURE.—A series of 27 cases of traumatic rupture of the spleen have been studied by R. Mowra (Rev de chir 51 97, 1932), who calls attention to the importance of watching for delayed hemorrhage It may occur, according to the author, from 24 hours to 18 months following injury. During the latent period there is a slight tenderness of the left upper quadrant, with some slight muscular rigidity and an elevation of temperature

The *treatment* of choice is **splenectomy** and if the operation can be performed in the latent period, the prognosis is much better than if the patient is seen at the time of the secondary hemorrhage. The splenectomy causes a temporary change in the normal blood picture and the loss of the organ is well tolerated in traumatic cases (see also Abdominal Injuries)

STEATORRHEA, IDIOPATHIC.—Idiopathic steatorrhea or Gee's disease, is a nutritional disturbance associated with tetany, osteomalacia and anemia

Fifteen cases, all of them adolescents or adults, were investigated by T I Bennett, D Hunter and J M Vaughan (Quart J M 1 603 (Oct) 1932). The principal features observed were fatty stools with or without diarrhea, and sometimes with dilatation of the colon, tetany, osteomalacia, anemia, skin lesions, and frequently infantilism.

All were born in Great Britain and had never resided elsewhere. In the majority of the cases, the history suggests that the disease originated in childhood, representing typical examples of celiac disease.

HISTORICAL.—In 1888, Samuel Gee published the first systematic account of celiac affection. The cases he reported occurred in people of all ages, but especially in young children. While the absence of obvious etiological factors was emphasized, together with the negative character of postmortem examinations in fatal cases, he added that he could not tell whether atrophy of the glandular crypts of the intestines was ever or always present.

The abdomen was noted as being distended by gas, the flatus was very fetid. The appetite for food in these cases dif-

fered in different cases, being good, ravenous or bad.

Gee stated that whether the patients would live or die, they lingered ill for months or years, and death was due, usually, to some intercurrent affection.

In Gee's opinion, this disease was indistinguishable from tropical sprue. In 1908, Herter rediscovered the disease that was apparently forgotten after Gee's original description. In Herter's book based on 5 cases in children with 5 others of shorter duration, the principal points mentioned were (1) arrest in the development of the body, (2) maintenance of mental powers and fair development of the brain, (3) marked abdominal distention, (4) anemia of moderate degree, (5) rapid onset of physical and mental fatigue, (6) various obtrusive irregularities referable to the intestinal tract.

He mentioned intestinal infection as the cause of the disease. Metabolic studies by Herter showed that there was practically no positive calcium balance in his cases. This, in his opinion, was due to absorption of mildly toxic but continually formed products.

In the second and third decades of the present century, medical literature has referred frequently to this condition, which was first described by Gee.

Table I represents the principal findings in the 15 cases described by the authors.

Steatorrhea and disturbances of calcium and phosphorus metabolism alone were constant findings in every case. Bone deformities or pains were the presenting symptom in 7 cases, diarrhea in 8 cases, and 5 cases complained of tetany. Bone involvement was present in all of the cases (see Table II).

In none of the 15 cases was a normal skeleton present. Ten of the cases were

TABLE I
RELATIONSHIP OF AGE OF PATIENT AND NATURE OF PRESENTING SYMPTOM

Case	Age of Onset of First Symptoms	Nature of First Symptoms	Present Age	Presenting Symptom When Seen by Authors	Present Condition	Work
1	11 yrs	Legs bent General weakness	16 yrs	Genu valgum	Invalid	Work in factory, 14-18
2	Infancy	Rickets	26 yrs	Genu valgum	Invalid	
3	1 yr	Diarrhea.	17 yrs	Bony deformities	Invalid	
4	3½ yrs	Diarrhea, cessation of growth	15 yrs	Genu valgum	Semi-invalid	
5	16 mos	Rickets	58 yrs	Deformities Diarrhea	Invalid	
6	Infancy	Diarrhea	34 yrs	Diarrhea	Invalid, very little housework	Watchmaker
7	Infancy	Diarrhea	22 yrs	Tetany and diarrhea		Student of music
8	Infancy	Diarrhea.	40 yrs	Diarrhea and tetany		
9	13 mos	Bony deformity Occasional diarrhea	34 yrs	Diarrhea and tetany	Invalid	
10	10 yrs	Not growing properly Diarrhea.	19 yrs	Infantilism Diarrhea		Inspecting parts at aeroplane factory
11	Infancy	"Consumptive bowels"	35 yrs	Tetany Diarrhea.		Inspecting parts at rubber factory
12	52 yrs	Diarrhea	57 yrs	Tetany Bone pains	Invalid	
13	18 mos	"Consumptive bowels"	19 yrs	General weakness		Garage hand.
14	Infancy	Diarrhea	16 yrs	Bone deformities	Invalid	
15	13 yrs	Knock-knee	56 yrs	Weakness Diarrhea.	Dead	Clerk

dwarfed, but the infantilism of stature was not necessarily associated with mental or sexual infantilism. Chemical examination of the feces showed the presence of steatorrhea in every case. The authors point out that dehydration of the stools rather than improved fat digestion or absorption is the reason why diarrhea tends to disappear in adolescent and adult life.

The infantilism which places so definite a stamp on the osseous and general

development of these patients is to be found reflected in their mentality. It is notorious that the child with celiac disease is often irritable and exacting though not lacking in intelligence. This mental phenomenon was seen in many of the cases in the present series, although several of them appeared perfectly normal.

TREATMENT.—Treatment of this condition presents great difficulties. Probably malabsorption of various foods

TABLE II
INFANTILISM AND CHANGES IN BONES

Case No	Age	Sex	Infantilism	Bone Deformities
1	16	M	+	Genu valgum sufficient to prevent walking relieved by osteotomies after admission. Bossed wrists Beaded ribs General osteoporosis Rickets of metaphyses
2	26	M	+	Genu valgum. Fracture of clavicle Bossed wrists Beaded ribs Osteotomy Bending of tibia and brim of pelvis Skull normal thickness Considerable osteoporosis Delayed union of epiphyses
3	17	F	+	Extreme bending of femora, tibiae, and fibulae, legs had been straightened by osteotomies several years previously but had re-bent Several fractures in recent years Patient has walked but has never run Bossed wrists Beaded ribs Splayed thorax Broke femur at 18, and opposite femur at 19 General osteoporosis Delayed union of epiphyses
4	15	F	+	Genu valgum Bossed wrists Beaded ribs Osteotomy Definite osteoporosis Rickets of metaphyses Delayed union of epiphyses
5	58	F	+	Marked genu valgum Great deformity with beaking of pelvis Marked thickening of calvaria with parietal bossing Bowing of forearms, femora, and tibiae Deformity of ribs Diffuse osteoporosis
6	34	M	+	Bowing of femora. Genu varum Marked thickening of calvaria with frontal and parietal bossing Prominent malar bones Beaded ribs Harrison's sulci "Arm" broken at 9 months Definite osteoporosis Delayed union of epiphyses
7	22	F	Nil	No bone deformity No history of fracture Slight generalized osteoporosis No rickets of metaphyses Epiphyseal union normal
8	40	F	Nil	Occasional pain in bones No history of fracture No abnormality in radiograms of bones
9	34	F	+	Severe genu valgum sufficient to prevent running General osteoporosis Bending of tibiae Gross deformity with beaking of pelvis Union of epiphyses normal
10	19	F	+	Dwarfism No other abnormality in bones
11	35	M	Nil	Genu varum Slight bowing of tibiae No fractures No osteoporosis
12	57	F	Nil	Walks with difficulty, bent and limping Bones tender, especially those of thorax Slight scoliosis Gross pelvic deformity Fractures of pubis, one rib, and ulna Considerable osteoporosis with thin trabeculated corticales
13	19	M	+	Genu valgum Bossed skull Beaded ribs Splayed costal margins Pelvis slightly deformed Healing fractures of right tibia, left tibia and fibula, right ulna Great osteoporosis with trabeculated corticales of long bones Skull normal in thickness but finely mottled No rickets of metaphyses Great delay in union of epiphyses
14	16	M	+	Can stand with support but is unable to walk Severe genu valgum. Gross bossing of wrists and beading of ribs Splayed costal margins Bowed forearms Scoliosis Triradiate pelvis Old fracture of right clavicle Recent fractures of three ribs Great osteoporosis with extensive rickets of metaphyses Skull normal thickness Great delay in union of epiphyses
15	56	M	Nil	Great outward and slight anterior bowing of femora in spite of osteotomies years before Left tibia bowed. Slight osteoporosis Epiphyses normal

is responsible for the major manifestations of the disease, and while nothing at present can be done to remedy the primary defect of the alimentary canal, much care is necessary in order to mitigate, if possible, the consequences of this defect. The major therapeutic indications are (1) control of steatorrhea by low fat diet; (2) control of carbohydrates by regulation of the intake of starch, (3) relief of tetany by increasing the intake of calcium and of **vitamine D**, (4) relief of the pain and to some extent the bone deformities of osteomalacia by the same means, (5) alleviation of anemia in its various forms by increasing the intake of such substances as **iron**, **marmite**, or **liver**.

The authors state that patients can seldom be given fat in the amounts found in the average diet without risking the occurrence of diarrhea.

A diet of high-calcium content should, in all cases, be supplemented by the administration of **calcium lactate**, best given fasting in doses of 5 Gm. (1½ drams) 3 times a day. **Calcium gluconate** and **calcium levulinate** in doses of 2 to 6 Gm (½ to 1½ drams) daily have been utilized. Small doses of calcium salts are useless in controlling tetany. In emergency, calcium gluconate must be given by intramuscular injection, and if this fails, slow intravenous injection of 15 c c (½ ounce) of a 5 per cent solution of calcium chloride must be employed. In no case is parathyroid hormone justified, for doses large enough to control the hypocalcemia would lead to further depletion of calcium salts from the skeleton. The use of **vitamine D** or of **ultraviolet irradiation** in *tetany* should always be considered.

Vitamine D should be given in every case where there are clinical or radio-

graphic signs of *rickets*, *osteomalacia* or *osteoporosis*. Bone pain is frequently relieved and a crippled patient is helped toward recovery, but any relapse of diarrhea is likely to interfere with its good effect.

In treating all forms of *anemia* it is wise to remember the importance of adequate dosage. **Iron** or **marmite** is given according to the type of anemia present.

The results of treatment are more disappointing in the adolescent and adult forms than appears to be the case in younger children suffering from celiac disease.

STERILIZATION, EUGENIC.

—This controversial subject continues to be dealt with in its numerous phases by medical and lay groups throughout the world and the literature contains reports of numerous committees which have studied the problem. W M English (*Am J Psychiat* 11.1 (July) 1931), in his presidential address at the meeting of the American Psychiatric Association, in 1931, made a plea for sterilization of the feeble-minded to control the spread of mental deficiency. He called attention to the general increase of mental deficiency, showing that between 1906 and 1928 the incidence of feeble-mindedness in England increased from 4 to 8 per thousand.

R A Forster (*J M A South Africa* 4 611 (Oct 25) 1930) states that, according to English investigators, 80 per cent of mental defectives come from pronounced "neuropathic" stock. The neuropathic diathesis is regarded as the cause of the minor neuroses, psychoses and epilepsy. However, this diathesis does not show itself in many descendants who are normal, but who are carriers, as it were, capable of tainting good

stock As agreement on the principle of sterilization is very problematic, it is considered that compulsory laws are the only means of handling the situation

The Central Association for Mental Welfare expressed satisfaction at the recent report of the British Medical Association on sterilization of mental defectives In common with all organizations that have given consideration to the problem, the Association regards it as axiomatic that no mentally defective person, as defined by the mental deficiency acts, should have children Today the economic strain tempts many to think that by a general measure of sterilization, the high costs of segregation in institutions might be avoided, but sterilization is not so simple a solution of the difficulty as it would appear.

It is necessary to know how far institutional care would still remain essential however widely sterilization might be adopted, and, conversely, to know what type of defectives, when sterilized, could still be allowed to live safely under supervision in the community The voluntary sterilization of defectives is advocated by a number of leading English physicians (London Correspondent to J A M A 99 842 (Sept 3) 1932) who are members of the Eugenic Society as a valuable accessory means of dealing with an otherwise discouraging problem They believe that a law legalizing voluntary sterilization would do much to disseminate the eugenic conscience which would be necessary in undertaking the larger problem of sterilization of the subnormal carriers of defects These carriers can often be detected, particularly if they have already given birth to defective children

At a conference on voluntary eugenic sterilization held by the Eugenic Society in England, it was pointed out that in

some American states in which sterilization of mental defectives had been carried out for a number of years, there appeared to be a diminished tendency to promiscuity among those operated on, probably because of careful education in the institutions and supervision afterwards Alberta, Canada, was said to be the only province in the British Empire which had an act authorizing sterilization of the mentally defective This act came into force in 1928 and by the end of 1931, 106 cases had been presented for sterilization and the operation had been approved in 101

The subject of compulsory sterilization and whether sterilization by a physician at the request and with the consent of the person to be sterilized is or should be permissible under the law is being raised more and more frequently in Germany Oberreichsanwalt Professor, Doctor Ebermayer, former attorney general of the Reich, and a member of the commission engaged in drafting a new penal code for the German Reich, does not favor the introduction of compulsory sterilization on the grounds that it constitutes a drastic negation of the right of self-determination

A number of bills dealing with sterilization failed to pass several of the state legislatures in 1931, *viz*, California H 918, Georgia H 6, Indiana H 304, Iowa H 578, Michigan H 472, Missouri H 594, Ohio S 20, Pennsylvania H 1209

STOMACH.—PHYSIOLOGY.—

Normal Gastric Secretion.—J Lerman, F D Pierce and A J Brogan (J Clin Investigation 11 155 (Jan) 1932) report their findings in 200 patients The technic used differed from other workers in that a combined test with histamine and an alcohol meal was used in all cases Previous writers had used

the ordinary Ewald meal, or histamine alone, or a combination, in cases of achlorhydria. D T Davies and T G I James (Quart J Med 24 1 (Oct) 1930) investigated the gastric acidity of 100 persons over 60 years of age. Vanzant reported the findings in 3381 gastric analyses done on patients without disease ordinarily thought to modify gastric acidity. W S Pollard and A

Topfer's reagent and phenolphthalein as indicators. The cases selected were apparently free from any abnormality thought to influence gastric secretion, and ranged in age from 20 to 69 years. There were 90 males and 110 females.

The average free acidity was found to be 40.4 cc of 0.1 normal HCl per 100 cc and total acidity 50.1 distributed in age groups as follows:

Ages	20	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	70+	Average
Average free acid	50.2	43.3	36.8	42.4	38.7	38.8	57.8	40.4
Total acid	57.2	53.2	46.7	51.4	48.2	50.4	62.6	50.1

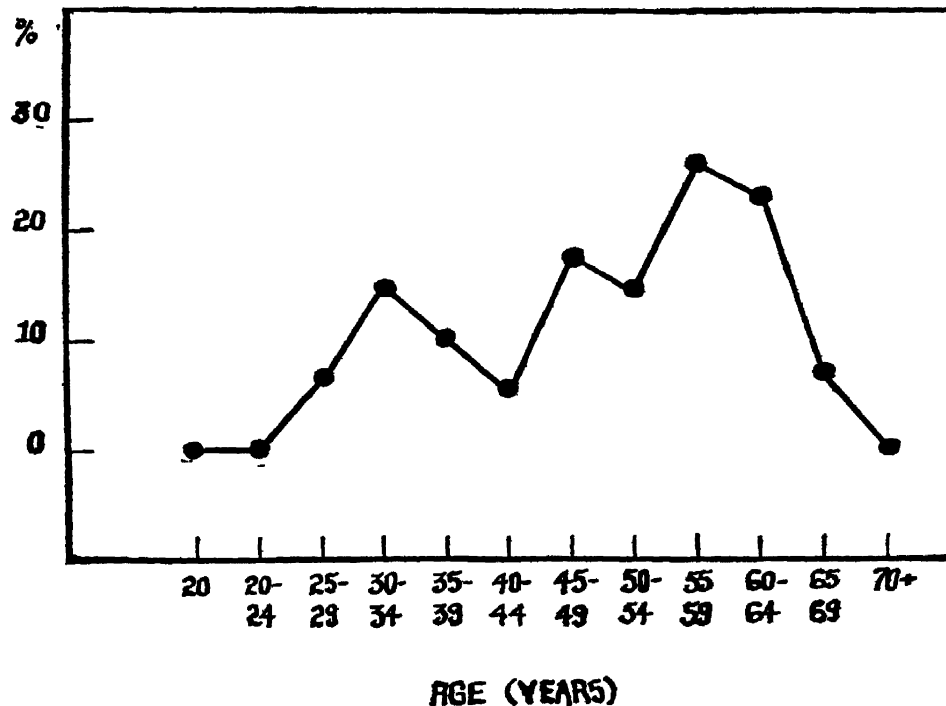


Fig 1—Percentage incidence of achlorhydria in normal people in different age groups (Lerman, Pierce and Brogan J Clin Investigation)

L. Bloomfield (J Clin Investigation 9 651 (Feb) 1931) used histamine alone in a series of cases in an attempt to establish unusual findings.

The present writers gave 0.5 mgm of histamine and 50 cc of 7 per cent alcohol. Samples were drawn at $\frac{1}{2}$ and 1 hour intervals. The volume, free acid and total acidity he recorded, using

It will be noted that the average figures showed no marked variations with age. The incidence of achlorhydria, however, as indicated in Fig 1, showed a definite increase in the higher age groups.

Anacidity was found in 13 per cent of the total, distributed in the following age groups:

Ages	20 to 29	30 to 39	40 to 49	50 to 59	60 to 69	Total
Cases	1	5	4	10	6	26
Per cent of total cases	0.05	2.5	2.0	5.0	3.0	13.0
Per cent of achlorhydria	4	20	15	38	23	100

The authors call attention to the lessened incidence in the last decade, a finding also noted by Vanzant, who suggested a higher mortality rate in this age group in persons with achlorhydria.

Hyperacidity was found in 16.5 per cent, normal acidity in 49.5 per cent (normals being taken as 20 to 70 c c), and hyperacidity in 21.0 per cent. The latter were divided into various age groups.

A correlation was found between gastric acidity and red blood cell and hemoglobin determinations. The average free acidity for 22 cases with counts under 4,000,000 cells was 31.4, and for 21 cases with counts over 5,500,000 cells was 53.3, while for 15 cases with hemoglobin values below 60 per cent, the acidity was 19.7, and in 98 cases with hemoglobin above 80 per cent, 41.3.

F. R. Vanzant, W. C. Alvarez, G. B.

Ages	—20	20-29	30-39	40-49	50-59	60-69	70+
Cases	1	4	6	9	13	6	3

The authors found that the average secretion in various age groups was higher in the male than in the female until age 50, when the values tended to become equal.

The average for the male was 44.7 and for the female 36.8. The findings may be summarized as follows:

	Males, Per Cent	Females, Per Cent
Anacidity	10.0	15.4
Hypoacidity	11.1	20.9
Normal acidity	55.6	44.5
Hyperacidity	23.3	19.2

Eusterman, H. L. Dunn and Joseph Berkson (Arch. Int. Med. 49:345 (Mar.) 1932) analyzed 3746 records in an effort to establish normal gastric acidity figures. The chief aim of these investigators was to compare acid levels at various ages—a subject little discussed in the literature. W. S. Pollard and A. L. Bloomfield's work on 90 patients (*loc. cit.*) is quoted as showing an increase ratio between age and acidity. In the present series, all patients with definite evidence of gastric intestinal

	Red Cells—Millions				
	Less Than 4 Per Cent of Cases	4 to 4.49 Per Cent of Cases	4.5 to 4.99 Per Cent of Cases	5.00 to 5.49 Per Cent of Cases	5.5+ Per Cent of Cases
Anacidity	18.2	16.0	12.5	14.0	0
Hypoacidity	27.3	22.0	12.5	12.0	14.3
Normal	45.5	40.0	57.1	52.0	52.4
Hyperacidity	9.1	22.0	17.9	22.0	33.3

disease were excluded, as were cases giving a history of alcoholism, or evidence of syphilis, cardiorenal disease, etc. In the younger groups, insufficient data were available, necessitating the use of 365 cases from previous literature.

The test used by Vanzant and his co-workers consisted of 8 arrowroot cookies and 400 cc of water, with extractions at 1 hour. If acid was not

while in women it varied from 3 per cent at 20 to 25 years, to 28 per cent. at 60 years. Twelve and nine-tenths per cent of the males and 17.4 per cent of the females were classed as having an apparent achlorhydria, while 10 to 8 per cent of the males and 13.8 per cent of the females had true achlorhydria in the series. The highest percentage in each group was reached at

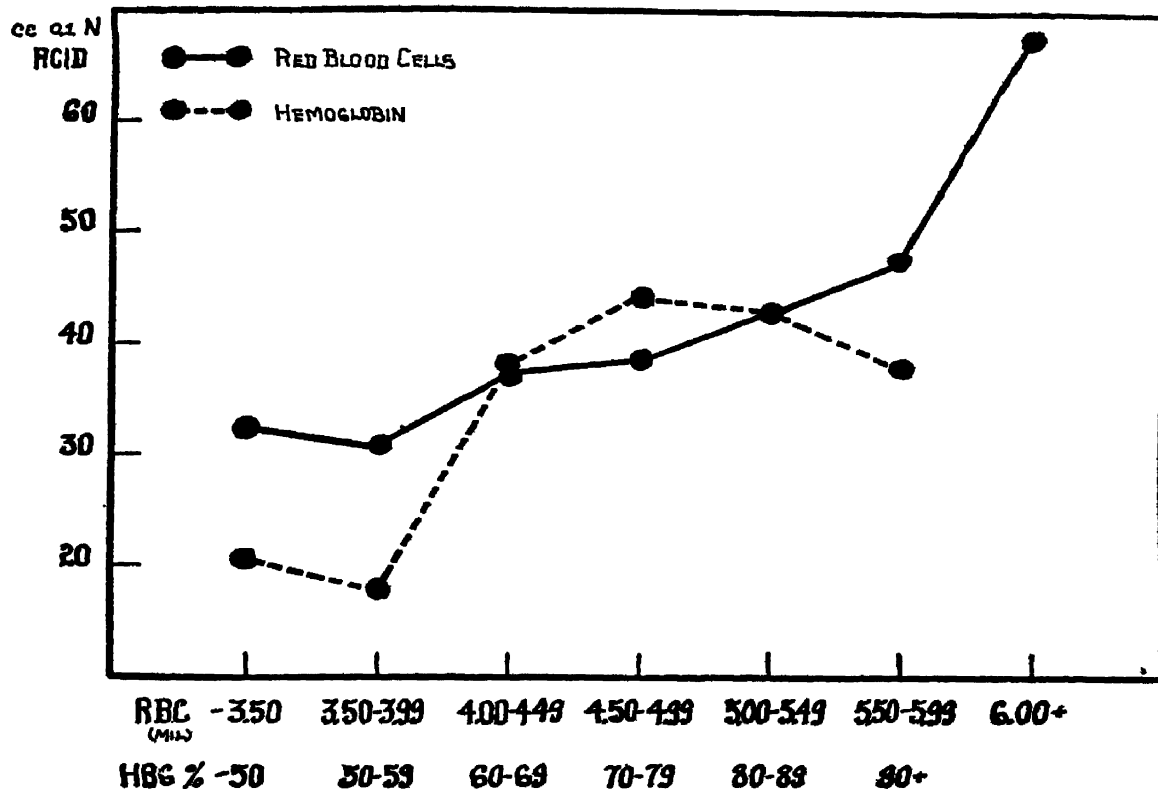


Fig 2—Average free acidity of normal people according to levels of red blood cell count and hemoglobin content. (Lerman, Pierce and Brogan. J Clin Investigation)

present at this time, 3 additional specimens at 15-minute intervals were taken. Cases not showing acid after repeated tests, or after histamine, were considered to have a true achlorhydria. It was found that the incidence of this finding increased progressively to age 65, with a definite falling off after that age. Women were found to show a greater tendency to achlorhydria. In men, the incidence varied from 0 per cent at 20 to 25 years to 23 per cent at 60 years,

age 60 to 64 (males 23.1 per cent, females 28.1 per cent).

Excluding all cases of true or apparent achlorhydria, the writers found that the "modal free acidity for men ranges between 45 and 50 units in the years from 20 to 40. After this, it falls off rapidly to a level of from 30 to 35 units in the aged. The mode for women is approximately 35 units throughout adult life. It appears to fall off slightly after the age of 60 years. The normal

range of free acidity in both men and women is about 90 units." The modal total acidity for women was about 51 units from 20 to 60 years of age, while in men it decreased from 66 at age 20 to 56 at 65 years.

The data suggest that a process which gives rise to achlorhydria is not the same as the one that in men after 40 years produces a gradual falling off in acidity. The absence of such a gradual decrease in the older women makes it improbable that in either sex there is a progressive senile atrophy of the gastric mucosa.

Effect of Neurogenic Factors on Gastric Secretion and Disease.—In experiments on dogs, J. Friedenwald and M. Feldman (Arch Int Med 49:234 (Feb.) 1932) noted that section of the left vagus nerve immediately below the diaphragm produces but a negligible change in the gastric secretion as compared with the normal. Following section of the anterior gastric branch of the left vagus nerve, the acidity may remain either normal or become markedly decreased. Section of the principal anterior branch of the left vagus is followed by slight decrease in the gastric acidity. After section of the left vagus in the neck, the secretion continues to be normal or there results a marked diminution in the acidity. Following section of the right vagus nerve, the observations vary but slightly from the normal. It is, therefore, evident that while at times changes in the gastric secretion occur owing to section of the vagus nerve, these are inconstant, there is likewise a general tendency for this secretion to return to normal when diminished as the result of this operation.

H. Cushing (Surg. Gynec. Obst. 55:1 (July) 1932) reports 11 cases of *intracranial disease* accompanied by lesions

of the upper gastrointestinal tract. These included 4 cases of cerebellar tumor, 1 case of olfactory groove meningioma, 2 cases of malignant hypernephroma with marked papilledema, 1 case of aneurism of the basilar artery, 1 case of right parietal metastatic hypernephroma, 1 case of median cerebellar medulloblastoma, and 1 case of tumor of the third ventricle. In the first 10 cases death occurred after short periods of hyperpyrexia and autopsy was probably performed soon enough to preclude the possibility of postmortem digestion. The findings varied from acute hemorrhagic erosions of the gastric mucosa and esophageal or gastric perforation to extensive esophageal or gastric malacia. In a case of malignant hypertension with marked papilledema, in which death occurred 5 days after a perforated gastric ulcer had been closed, autopsy revealed an extensive gastromalacia. In the case of median cerebellar medulloblastoma, which was treated by irradiation over a period of 2 years, definite preoperative evidence of a duodenal ulcer was confirmed at autopsy. In the case of tumor of the third ventricle, which has responded excellently to irradiation, subjective symptoms and x-ray findings of duodenal ulcer are present only when the cranial lesion is active.

All of the types of gastrointestinal disease found in these 11 cases were described by Rokitsansky from 1841 to 1846. This investigator stated that the proximate cause may be looked for in diseased innervation of the stomach due to a morbid condition of the vagus and extreme acidification of the gastric juice. This was the first definite suggestion that an ulcerative process of the upper alimentary tract may be of neurogenic origin.

Although the teachings of Rokitansky have been superseded by the concepts of Virchow, who believed that ulcer is essentially a local process, Rokitansky's theory that ulcer has a neurogenic basis has gained wider acceptance as knowledge of the vegetative nervous system and its cerebral connections has increased.

Further confirmatory evidence may be found in the large number of case reports in the literature describing cranial lesions associated with disease of the upper part of the gastrointestinal tract. Support for the neurogenic origin of ulcer may be found in the work of Schiff, who observed that, in dogs and rabbits, a unilateral cerebral lesion involving the optic thalamus and adjacent cerebral peduncle often led to "softening" of the stomach and occasionally to perforation. These findings were confirmed by Brown-Séquard, Elstein, Kellar, and others, but whether the secondary peptic lesions are due to parasympathetic (vagal) stimulation or a sympathetic paralysis must remain conjectural until more precise information is at hand. However, in man, stimulation of the parasympathetic center by intraventricular injections of pilocarpine or pituitrin causes an increase in gastric motility, hypertonus, and hypersecretion, leading to retching and the vomiting of vomitus containing occult blood. The same effects, associated with observable patches of hyperemia of the gastric mucosa, have been found by Beattie to follow direct electrical excitation of the tuber cinereum in animals.

It is probable that under normal conditions the parasympathetic apparatus is likewise strongly affected by cortical or psychic influences. As a result, there may be a direct stimulation of the tuber or its descending fiber tracts, or what

theoretically amounts to the same thing, a functional release of the vagus from paralysis of antagonistic sympathetic fibers, leading to hypersecretion, hyperchlorhydria, hypermotility, and hypertonicity, which are especially marked in the pyloric segment. Spasmodic contractions of the musculature, possibly supplemented by local spasms of the terminal blood-vessels, produce small areas of ischemia or hemorrhagic infarction, leaving the overlying mucosa exposed to the digestive effects of its own hyperacid juices.

Thus it is possible to reconcile the neurogenic theory of ulcerations sponsored by Rokitansky with Virchow's variously modified theory of a primary local cause, whether the lesions are considered as simple erosions, acute perforations, autodigestive softening, or chronic ulcers, and whether they involve chiefly the esophagus, the stomach, or the duodenum.

GASTROPTOSIS.—A Jentzer (Rev. med. de la Suisse Rom. 52:335 (May 25) 1932) states that ptosis of the stomach may exist independently of other pathologic changes, but that it is almost always accompanied by dilatation and atonicity. Lesions of chronic gastritis are habitual in gastroptosis and sometimes more serious disorders, such as cancer, ulcer and biloculation, exist. While gastroptosis may exist alone, it is often part of a complex syndrome, owing to ptosis of most of the abdominal organs.

Etiology.—Among the factors favoring the development of gastroptosis may be mentioned congenital predisposition, dietetic and therapeutic errors, infectious diseases, compression of the epigastric region, loss of weight, and pregnancy. Several theories of pathogenesis are discussed.

Symptoms.—The subjective gastric symptoms are variable sensations of fullness after eating, loss of appetite, etc. In the phase of active dilatation with hypertrophy, hunger pangs are felt. Other symptoms are clapping, frequent eructations, sometimes vomiting, constipation, cardiopulmonary disturbances, nervous disturbances, and malnutrition.

Diagnosis is aided by insufflation, x-rays and intubation. It is important to differentiate between a true pyloric obstruction and primary gastroparesis.

Treatment.—For surgical therapy Jentzer (*Ibid*) recommends Lambert's operation, which consists in suspending the stomach at the level of the greater curvature. Lambert uses a strip of aponeurosis taken from the left side of the left abdominal rectus, pediculated at its upper portion, introduced into the abdomen between two ribs, and fastened to the entire length of the greater curvature and sutured at its free end to the round ligament at the point where it separates from the liver. The author uses dead tendons instead of an aponeurotic strip for the suspension, because it shortens the duration of the operation, diminishes the shock, and avoids lateral cicatrices, postoperative complications and, finally, the partial destruction of the abdominal wall. The aponeurotic band and the tendon do not appear to be resorbed, but if this should happen, it would not be very serious, as the stomach would have had time to retract and regain its tonicity. The author hopes this operation will replace the use of abdominal straps, which provoke atrophy of the abdominal muscles. Lambert's operation is physiologic, it does not act from one day to the next, but progressively, without touching the mucosa, and while it does not always

cure the disorder, it cannot harm the patient.

INTERMITTENT GASTRIC VOLVULUS.—**Diagnosis.**—Intermittent gastric volvulus is considered by M. Fanucci (*Policlinico (sez. chir.)* 39:35 (Jan. 15) 1932), who outlines the history of a case, diagnosed by x-rays, which later came to operation. Concerning the classification he admits that he is inclined to follow the clinical order as corresponding more closely to the realities of general practice. A definite diagnosis must be based on x-ray examination, but a careful examination of the case history may in some instances give rise to the suspicion that an intermittent volvulus is present.

GASTRIC AND DUODENAL ULCERS.—**Etiology.**—The problem of the causation of peptic ulcer seems as far from solution as ever, though intriguing facts are constantly being brought to light. R. H. Miller (*New England J. Med.* 206:925 (May 5) 1932) points out that gastric ulcers occur on the lesser curvature, usually near the pylorus, benign ulcer never occurs on the greater curvature, and duodenal ulcer is usually within an inch of the pylorus, where the duodenal mucous membrane first comes into contact with the acid chyme expelled from the stomach. The more Miller studies the etiology, the more he is impressed with the fact that *disturbances in the relaxation of the pyloric sphincter* (achalasia) probably have a great causative effect, in that such disturbances prevent the normal regurgitation of alkaline duodenal contents into the stomach to neutralize the irritating acid of that organ. This difficulty has been treated by some surgeons by attempting to sever the nerves which cause contraction of the pyloric musculature. The possibility of peptic ulcer be-

ing, at least in part, dependent upon, and resulting from, an *infection elsewhere in the body*, is being continually studied, and the finding of the same strains of streptococci in ulcers as in distant foci, is an observation of enough scientific accuracy and constancy to demand consideration. The modern treatment of ulcer includes the removal of all such possible foci. The familial tendency to peptic ulcer is constantly noted, as well as the so-called "ulcer diathesis," or, it might be said, individual susceptibility.

A recent report by Schutz regarding the etiology, presents a study of 30 post-mortem specimens, and he states that the lesion may be the direct result of *infarction* due to arterial disease, with *embolism* or *thrombosis*, he says that the ulcer progresses because of secondary infarcts in its floor, and that similar lesions can be found elsewhere in the body. One of the most striking facts about peptic ulcer is its *seasonal recurrence*, and Einhorn, in an exhaustive study of 800 patients, finds the greatest number of recurrences in September and May, diet, pressure, and psychic trauma bring on some recurrences, though in 25 per cent of all the cases, the cause of return of activity could not be determined.

Irritating foods have not been very seriously considered as an etiologic factor, but a recent report on the high incidence of ulcer in native Abyssinians, who eat huge amounts of cayenne pepper, affords occasion for speculation. The possible inter-relationship of ulcer, cholecystitis, and appendicitis requires more than passing comment, and at times suggests an *infectious* etiologic connection. As Larimore states, "appendiceal disease has been associated in the majority of ulcer and cholecystitis cases." It is a sound doctrine that in

the performance of surgical operation for ulcer or gall-bladder disease, the appendix should be inspected and, if possible, removed.

Symptoms.—According to W. H. Bueermann (Northwest Med 30 492 (Nov) 1931), the peptic ulcer syndrome is perhaps the purest one of all encountered in the surgical dyspepsias. The author outlines the syndrome as follows:

Long history

Daily repetition of

Food	} Duodenal ulcer	Food	} Gastric ulcer
Comfort		Comfort	
Distress		Pain	
		Comfort	

Relief by

Food.

Alkalis

Emptying stomach

Periodicity

"Spells," often seasonal, periodic, alternate with complete freedom

Bueermann points out that the average duration of symptoms before consulting medical service is about 12 years for duodenal ulcer, and about 9 8 years for gastric ulcer. In a review of 5732 peptic ulcers, C. H. Mayo found that 79 per cent were located in the duodenum. There is little to be gained by trying to differentiate from history alone between duodenal and gastric ulcer. This is admittedly a function of the x-ray laboratory. However, when the accuracy of a peptic ulcer syndrome has been established, it is a 4 to 1 wager that the lesion is located in the duodenum.

The presence of night pain, relieved by the same methods employed to relieve the distress during the day, is also strongly indicative of peptic ulcer, especially if, in addition to the usual methods of relief, the patient finds that mid-epigastric pressure tends to relieve his

distress Night pain is a sign of hypersecretion and a valuable danger signal indicating early retention

Pain, radiating through to the back and synchronous in time of onset with the regular peptic ulcer syndrome, is strongly suggestive of a chronic perforation of the ulcer This is pathognomonic if, in addition to the back pain, there is associated an almost continuous epigastric distress in place of the regular pain-food-comfort sequence Nicolayson, in a pathologic study of chronic gastric ulcers, found that over 90 per cent of his series of ulcers had perforated through the muscularis mucosa as a chronic perforation, with omentum or pancreas incorporated into the base of the ulcer Duodenal ulcers of the posterior wall are also very prone to develop subacute or chronic perforation A history of "acute indigestion" or "ptomaine poisoning" injected into a peptic ulcer history should arouse the suspicion of perforation

Peptic ulcer complicated by obstruction, perforation, hemorrhage or carcinomatous degeneration, tends to lost type The day by day sequence of pain, food, ease, merges into a more or less continuous epigastric distress

Complications—Bleeding from peptic ulcers, as outlined by R H Miller (*loc cit*), is one of the serious events which arise often without warning, and may be extremely dangerous It is well to remember that, as a general rule, *bleeding ulcers do not perforate*, and *perforating ulcers do not bleed* Hinton has just reported 52 cases of hemorrhage from ulcer, in which there were 10 deaths—6 in unoperated and 4 in operated patients The fatal cases were mostly in patients with negative or short histories At times, it is almost impossible to differentiate the bleeding from

ulcers and that from a dilated ruptured vein (as in cirrhosis of the liver) Except in chronic ulcers, which will usually give a suggestive history, operation is notoriously difficult and dangerous, and should ordinarily be undertaken only as a last resort For *acute hemorrhage*, the patient should be put in bed, given **nothing by mouth**, fluids by **clysis or vein**, and **morphine** at regular intervals If bleeding persists, 1 **transfusion** and then another, should be given before operation is decided upon, if operation seems to become imperative, it should be undertaken only if at least one or more blood donors are present Soper has recently recommended the placing of a **duodenal catheter in the stomach** in these cases, the catheter removes clots and gastric contents and allows of the detection of fresh hemorrhage, and he says that on the third or fourth day the catheter may be allowed to pass through the pylorus, and the patient be fed through it

Acutely perforated ulcers require, of course, **immediate operation** with **suture** of the perforation Miller considers that if the perforation has not lasted more than 6 hours there is usually no necessity for drainage The question of **gastroenterostomy** at the time of operation has been much discussed, this should at any rate not be done after 6 hours In a recent report, White and Patterson find 60 to 65 per cent cured of their ulcer symptoms by suture alone, and only 10 to 15 per cent required later operation The only reason for immediate gastroenterostomy would be very obvious pyloric obstruction

Three cases of *perforated* duodenal ulcer in young men all seen within 23 days, are reported by J G Lewis (M Ann Dist of Columbia 1.155 (June)

1932) In only 1 of the cases was there a history of previous digestive symptoms The removed tissues in this case indicated that the condition was chronic Pathologic changes in the other 2 cases were evidently more recent and, in 1 of them, definitely acute A common factor was that each of the 3 patients had used alcoholic beverages immoderately The patient whose ulcer was chronic was an habitual heavy drinker, the other 2 patients had been drinking heavily for from 10 days to 4 weeks immediately before the perforation took place The author suggests that alcohol may have precipitated the accident in all 3 cases

Treatment.—J Gilmour and J H Saint (Brit J Surg 20 78 (July) 1932) report a series of 64 cases of acute perforated peptic ulcer Sixty-three were treated by simple suture and 1 by suture plus gastroenterostomy. The mortality rate in patients operated on under 12 hours was 0.5 per cent, and in patients over 12 hours, 15 per cent The total mortality was 4.7 per cent, emphasizing the importance of early operation The authors are of the opinion that these low figures fully justify the use of simple suture as the routine treatment of acute perforated ulcer The remote results of simple suture, suture plus gastroenterostomy, and excision and pyloroplasty are not so good as those recorded after resection. On this account, in treating recurrent ulcer or complications the surgeon should be prepared to consider partial resection rather than palliative measures as a secondary operation Approximately one-third of the patients eventually had to have a secondary operation performed, the remaining two-thirds being in such good health as to preclude the necessity for further operative intervention

Indications for Surgical Treatment—R H Miller (*loc cit*) states that gastric and duodenal ulcers are principally initiated and maintained by disturbances in the acid-alkali balance, and these, in turn, are due to malfunction of the pylorus, more particularly failure of proper relaxation (achalasia) to allow regurgitation of alkaline duodenal contents Any treatment must take this into consideration

Gastric ulcer must be watched carefully, to be sure it is not cancer If it is as large as a 25-cent piece, one should be very suspicious In cases of doubt, operation is indicated

Duodenal ulcer may be treated medically until the patient elects surgery, and then the simplest reasonable operation should be done

In hemorrhage from ulcer, operation should be undertaken only as the last resort

Operative Treatment—According to R H Miller (*loc cit*), when it comes to a decision as to what operation shall be done, 2 opposed schools are encountered, *i.e.* (1) those who prefer the simplest and least radical operations, such as gastroenterostomy or pyloroplasty, and (2) those who do more or less extensive gastric resections (this group includes most of the European surgeons) The most popular and generally satisfactory operation has been the gastroenterostomy, which furnishes a new outlet in the stomach, allows food to pass out without irritating the ulcer, and provides for better neutralization of gastric acid Judd has been an ardent advocate of a simple operation by which he excises the duodenal ulcer, and at the same time removes half or more of the pyloric sphincter, thus making a wide opening between the stomach and duodenum; he claims that this is simpler than gastro-

enterostomy and, if anything, more satisfactory Deaver and Burden have written enthusiastically about a still simpler procedure, the submucous resection of part of the sphincter muscle; in this the lumen is not opened at all, and their results, to date, in 44 cases, have been very encouraging, the procedure is purely a plastic operation, and is not aimed at actual interference with the ulcer

The question of resorting to radical stomach resections for the treatment of duodenal ulcer, is one which has ardent supporters and equally ardent antagonists As a general proposition, the European surgeons are more radical than those of this country, and they do a much larger proportion of extensive gastrectomies for simple duodenal and pyloric lesions The reasons ordinarily advanced for the more radical procedure are (1) the failure to cure by gastroenterostomy, and (2) the high percentage of gastrojejunal and jejunal ulcers after gastroenterostomy Berg reports 515 cases of subtotal gastrectomy for both gastric and duodenal ulcer, and is strongly in favor of it, while Strauss and his coworkers report 221 similar cases, their operative mortality being 5.4 per cent It is difficult to determine definitely the incidence of gastrojejunal ulcer after gastroenterostomy because the figures vary so widely—for instance, Berg puts it at 34 per cent, while Fremont-Smith and McIver find it in only 1.7 per cent Klein reports a few cases of duodenal ulcer, with very high acidity, in which he did partial gastrectomy with section of the left vagus nerve high up near the cardia; in his opinion this is a valuable procedure

A compromise between the simpler and more radical operations has been employed by Devine, who does a trans-

section of the antrum of the stomach, without removing any of it, and then does gastroenterostomy. This operation prevents the future access of any hydrochloric acid into the duodenum, but gives a new outlet to the stomach, and a means of regurgitation of the alkaline fluid through the stoma Miller believes that the operation for duodenal ulcer should be the simplest one which the surgeon can do with reasonable hope of success The author opposes gastrectomy, at the worst, if the simple operation fails, further steps can later be taken

In regard to *gastrojejunal ulcer*, a lesion which occurs on the margin of the gastroenterostomy stoma or in the jejunum nearby, at times made worse by a gastrojejunocolic fistula, Miller subscribes to conservatism at first as pointed out by F H Lahey (New England Jour Med 205 321 (Aug 13) 1931), who believes that dietary and rest treatment should always be tried Failure in this, Miller states that if the original ulcer, gastric or duodenal, has not healed, resection of the stoma, followed by partial gastrectomy, and some type of jejunostomy must be done, or if the original gastroenterostomy was done for duodenal ulcer, and the ulcer has apparently healed, the gastroenterostomy may be simply undone

Technical Consideration—It is the opinion of D delValle, Jr (Semana med 1 2 (Jan 7) 1932), that gastroenterostomy is the operation of choice for all cases of *benign pyloric obstruction*. It gives excellent results also in cases of gastric, juxtapyloric, and duodenal ulcer and ulcers located along the lesser curvature, especially those complicated by spasmodic phenomena

In addition to the immediate purely mechanical effect of drainage of the

gastrointestinal contents, the operation has a physiological effect, causing regurgitation of the biliary and pancreatic secretions from the bowel into the stomach. This phenomenon undoubtedly modifies the gastric chemism and is a factor diminishing the incidence of peptic ulcer of the jejunum.

The author favors the **posterior transmesocolic isoperistaltic gastroenterostomy** with a transversely placed stoma. He performs it usually under **local anesthesia** supplemented by **injection of the jejunal pedicles** in the operative field.

The mortality in his total number of cases, including cases of malignancy, was 18 per cent. In cases of benign conditions, including acute perforations, it was only 3 per cent. He draws the following conclusions:

- 1 Gastroenterostomy is the operation of choice in pyloric stenosis.
- 2 The technics of von Hacker and Moynihan give satisfactory functional results.
- 3 Under proper conditions and with proper selection of cases, the mortality should not exceed 1 or 2 per cent.
- 4 Gastroenterostomy is much more simple to perform and less dangerous in its effects than gastric resection.
- 5 Perfect hemostasis of the suture line prevents shock, gastrorrhagia, disturbance of the acid-base equilibrium, local infection, and lesser functional difficulties of the first few days after the operation.

O. Hoche and G. Marangos (Zentral f. Chir. 59 998 (Apr. 16) 1932) discuss the treatment of *nonresectable duodenal ulcers*, for which some surgeons advise "resection for exclusion," while others recommend gastroenteroanastomosis. In reporting 115 cases of gastric and duodenal ulcers, the authors performed **resection for exclusion** in 10 instances and **gastroenteroanastomosis** in 7 cases. In the cases where resection for exclusion was done, the

ulcer was situated low down on the duodenum, which penetrated into the pancreas. In all cases, two-thirds resection of the stomach and the resection of the pylorus was done. Prepyloric section of the antrum was never done, but the pylorus was always removed. The duodenum was resected close to the ulcer. Thus, the author's method of resection for exclusion differs considerably from the simple exclusion of the pylorus and also from the usual method of exclusion for resection, since it is much more radical and removes the pylorus as well as two-thirds of the stomach. After-examinations revealed that this method of treatment gives satisfactory results. The authors do not wish to discredit radical resection, but they emphasize that the resection for exclusion is advisable only for cases of ulcer deep down on the duodenum in which a radical operation does not seem feasible.

Dietetic Treatment Following Gastric Operations—After calling attention to the changes that are produced in the digestive tract by operations on the stomach, H. Neuffer (Wien klin. Wchnschr. 45 518 (Apr. 22) 1932) discusses post-operative complications such as vomiting, diarrhea and dyspepsia. He then shows what foods are advisable to avoid these complications. As most suitable he considers a diet that is **rich in carbohydrates but deficient in proteins and in fats**, for carbohydrates are readily digested without the aid of the stomach, but proteins require for their digestion gastric juice and should, therefore, be limited. The fat intake should be restricted because of the retarded flow of the duodenal juice, but gradually, as its flow and the acid secretion increase again, a larger amount of fat may be given. The author has followed these principles in 132 cases of extensive

gastric resection and in 8 cases of gastrotroenterostomy. As a result of this treatment, postoperative complications were almost entirely absent. The slight loss of weight that followed was quickly regained. The majority of the patients could be discharged with an adequate diet on the tenth or twelfth day. In the course of the first 4 weeks the patients usually gained about 3 Kg (6 $\frac{3}{5}$ lbs).

Whether the diet can or cannot prevent late complications, such as peptic ulcer of the jejunum, relapse of the ulcer, cholecystopathies, pancreatic disturbances or anemia, cannot be stated, since the time of observation is as yet comparatively short. In conclusion, the author emphasizes that the patient who has undergone resection of the stomach cannot be considered as cured but requires a careful dietary after-treatment. When the patient is discharged, he is given written dietary regulations designating what he is permitted to eat and what he should avoid. He is advised to follow these regulations for at least 2 or 3 months. After that, the diet can gradually be changed, but it is advisable to repeat the restricted postoperative diet from time to time to avoid late complications.

Late Symptoms and Effects Following Gastric Operations—H. L. Thompson (California and West Med 36 383 (June) 1932) reports a comprehensive study of the effects of resection of the pylorus on the secretory and motor functions of the stomach. The method is based on the application of certain standard and specially devised surgical operations to the normal stomachs of dogs. The physiologic effects of the operations are observed by gastric analysis and by x-ray examination. Contrary to prevailing opinion, and despite the fact that the pyloric sphincter regulates the

emptying of the stomach and the admission of duodenal juices into it, resection of the sphincter, combined with Polya gastrojejunostomy, does not lower the acidity of the gastric contents nor hasten emptying of the stomach.

Graduated multiple resections of the pylorus confirmed the prevailing belief that the pylorus is essential to physiologically normal gastric secretory function. A roughly quantitative relation between the amount of pylorus present and the efficiency of secretion is suggested. The fact that widening of the outlet of the stomach does not shorten its emptying time also is contrary to the general conception. The most important contribution resulting from this study refers to the apparent and real secretory functions of the pylorotomized stomach. The use of histamine and the Pavlov pouch disclose that the fundus, after removal of the pylorus, continues to secrete gastric juice having normal acid values.

The most important factor in the secretion of gastric juice by the pylorotomized stomach is the cephalic phase of secretion, as revealed by the performance of vagotomy. Achlorhydria occurring after pylorotomy is only apparent and is the result of neutralization by the duodenal juices and the food. In the past, the importance of the duodenal juices in this respect has been overemphasized, whereas the neutralizing capacity of the food has not been stressed sufficiently.

CARCINOMA OF STOMACH.

—The present conception of cancer of the stomach, according to W. H. Bueermann (Northwest Med 30 492 (Nov) 1931), is still that of its later stages. That gastric cancer has an early stage, during which it is curable, is often overlooked. It is true that this stage too

frequently masks behind a clinical picture which may simulate any of the surgical dyspepsias. To better understand the early stages, gastric cancer may be divided into 2 groups (1) the group in which the carcinoma grows into the gastric lumen, fungates and gives very few early symptoms because the gastric wall is not penetrated by the ulceration of the carcinoma. This group causes early symptoms only when the growth is near the pylorus. If the growth is in the midportion of the stomach, symptoms are, as a rule, not present until the size of the growth interferes with gastric motility, causing retention of food and vomiting. It is this group which often presents a painless palpable epigastric mass as the first sign of serious trouble, and is also responsible for the relatively short duration of symptoms commonly attributed to cancer of the stomach. The *prognosis* of this group is generally poor.

(2) There is, however, another group which gives symptoms at the very onset of trouble. As would be expected, this group ulcerates early and penetrates the wall of the stomach, producing irritation of the serous peritoneal covering of the stomach. This type of ulcerating cancer often mimics grossly the benign chronic peptic ulcer, and shows a high acid titer by test-meal, together with the x-ray picture of a penetrating crater lesion of the stomach, thereby causing diagnostic difficulties. The patient during this early stage may present a well-nourished appearance, show none of the cachectic appearance of the first group when symptoms are first discovered, and may even show temporary improvement with gain of weight on an ill-advised alkaline therapy and bland diet management.

The following syndrome in carcinoma of the stomach is outlined by the author:

Appearance

Progressive decline

Loss of vitality, weight, strength

Persistence of distress

Usual remedies are ineffectual

Findings after a Riegel meal

Altered blood

Rancid food elements

A careful clinical investigation should be urged upon every patient over 40 years of age who complains of the progressive persistence of symptoms of dyspepsia, of which he had not previously complained. Especially is this true if the symptoms of a long-standing dyspepsia are of changing character, or the newly-acquired dyspepsia is not responding to the usual remedies.

The weight loss found in carcinoma of the stomach is greater than in any other type of dyspepsia. After the malignancy is moderately advanced, the epigastric distress persists in spite of the usual remedies, rest, bland foods, alkalis and lavage. Nothing gives complete ease, although vomiting relieves temporarily.

Surgical Treatment. — G. Miller (Canad M A J 24:164 (Feb) 1932) states that it is evident, as is becoming generally recognized, that primary cancer of the stomach can be cured by resection in many cases if it can be recognized early. The diagnosis must be made before the symptoms of cancer necrosis make their appearance. These symptoms include cachexia, secondary anemia, loss of weight, pain, and persistent vomiting. Insidious changes in the patient's gastrointestinal habits are the first symptoms of cancer and should always be watched for in elderly patients. The public must be educated to take slight gastric symptoms seriously when they come on after the age of 40. When such symptoms arise, they call for special investigation by trained gastro-

enterologists. No carcinoma of the stomach should be called inoperable, unless nodules can be definitely palpated in the liver, the left supraclavicular lymph node is hard and on biopsy shows metastases, the pouch of Douglas is involved, or, in the female, Krukenberg tumors are present in the ovaries. These are bilateral nodular tumors in the ovary which are always secondary to carcinoma of the stomach or occasionally of the breast.

A woman should not be operated on for carcinoma of the stomach or even of the breast without a pelvic examination being made to exclude the presence of metastases in the ovaries or in the pouch of Douglas. Cachexia is not a contraindication to laparotomy, as with local or spinal anesthesia and with delicate handling of the tissues, these patients will survive operation in the vast majority of cases. Further, cachexia is rarely due to widespread dissemination of the tumor, but to necrosis of the primary tumor. Ascites is not a definite contraindication to operation, as it may be the result of cachexia or of pressure by the tumor on the portal vein.

LINITIS PLASTICA.—Linitis plastica is discussed by E. Michalowski (Polska gaz lek 11 104 (Feb 7) 1932), who states that since Brinton described the diffuse hypertrophy of the submucous connective tissue of the stomach, the number of synonyms for linitis plastica has increased to about 20. Michalowski recommends extreme skepticism as to the entity of this disease. He describes the case of a woman, operated on successfully in 1924 by Rydygier according to the first method of Billroth. Relapse occurred after 4 years. The second laparotomy revealed a scirrhus carcinoma at the pylorus and metastasis in the liver. At this time jejunostomy

was performed. Several days later the woman died. The author concludes that there is no sign, clinical, x-ray or macroscopic, in linitis plastica. He considers the great majority of these cases, if not all of them, as certain forms of carcinoma of the stomach, mostly of the fibrous, disseminated variety.

Differential Diagnosis.—G. Vita (Radiol med 50 63 (Jan) 1932) reports the case of a woman 55 years of age who gave a history of dyspepsia for about 6 years, but had not lost weight and showed no anemia. X-ray examination revealed a filling defect in the antrum of the stomach and delayed emptying. The rugæ in the area of the filling defect were not obliterated, but were small, corresponding to the rugæ seen in atrophy of the mucosa. The mobility of the stomach was normal.

Gastric resection was performed. The resected specimen showed hyperplasia of the submucosa, muscularis, and subserosal layers of the gastric wall. Areas of hyalinization were evident throughout, but were more numerous in the middle and internal layers. Pericellular infiltration was found especially in the subserosa. The mucosa showed mild hyperplasia. There was no evidence of malignancy. The histological diagnosis was chronic gastritis.

The author believes that the condition in this case was the benign linitis plastica. He reviews briefly the characteristics of this type of linitis plastica, cites similar cases reported in the literature, and discusses the differential diagnosis of the condition from carcinoma, syphilis, and tuberculosis.

GASTRIC HEMORRHAGE.—**Etiology.**—The diagnostic significance of hematemesis has been discussed by A. B. Rivers and D. L. Wilbur of The Mayo Clinic (J A M A 98 1629).

(May 7) 1932) Although the vomiting of blood is often an alarming symptom, the primary hemorrhage is rarely fatal, according to the authors. Diagnostic features are usually present even when the causes are unusual, but at times no source can be discovered even at operation or necropsy, an observation also stressed by Bortz (*sic*).

A series of 668 cases admitted to the clinic complaining of hematemesis was the basis of the study. Of these patients, 432 were subjected to surgery. The cases were divided into 3 groups: (1) intrinsic gastroduodenal or jejunal lesions, (2) hemorrhage in which varices seemed of significance, and (3) infrequent causes of hematemesis. Ninety per cent of the cases fell into the first group, 50 per cent of the entire series being due to duodenal ulcer, while 6.4 per cent were due to gastric ulcer. Carcinoma of the stomach appeared in less than 1.3 per cent. Other causes included benign tumors and syphilis.

In the second group, those cases dependent upon varices, the most common diagnoses were splenic anemia (27 per cent) and cirrhosis of the liver (18 per cent).

The third group, infrequent causes, included cases of cholecystitis (1.9 per cent), hemolytic icterus, hemophilia, hemorrhagic purpura (each 0.15 per cent) and indeterminate (2.2 per cent).

TABLE I

CASES OBSERVED IN WHICH THE COMPLAINT WAS HEMATEMESIS (1927 AND 1928)

Group	Condition	Cases	Per Cent
1	Duodenal ulcer	356	53.30
	Gastric ulcer	43	6.40
	Ulcer type history, roentgenologic examination negative	22	3.30
	Secondary or reactivated ulcer	92	13.80

Group	Condition	Cases	Per Cent
	Carcinoma of stomach	84	12.60
	Benign myoma of the stomach	1	0.15
	Pyloric lesion	1	0.15
	Gastric syphilis with hepatic involvement	1	0.15
	Adenoma of duodenum	1	0.15
	Cholecystoduodenal fistula	2	0.30
2	Cirrhosis of the liver	12	1.80
	Splenic anemia	18	2.70
	Hemorrhage following splenectomy	4	0.60
3	Cholecystitis	13	1.90
	Hemolytic icterus	1	0.15
	Hemophilia, with ulcer type history	1	0.15
	Hemorrhagic purpura	1	0.15
	Indeterminate	15	2.20
Total		668	

The following conclusions were drawn by the authors:

1 The source of hematemesis may usually be determined with accuracy if data, obtainable through a detailed anamnesis, careful general examination and systematic laboratory data, are carefully evaluated.

2 The most common cause of hematemesis will be found in intrinsic gastric, duodenal or jejunal lesions. Peptic ulcer is by far the most common cause of this symptom. It is well to remember that indigestion and hemorrhage usually mean an intrinsic gastrointestinal lesion.

3 Diseases in which varices are likely to develop are next in importance in the production of hematemesis, they accounted for 5.5 per cent of the 668 cases of this series.

4 Vomiting of blood is a rare complication in blood dyscrasia, and the recognition of such diseases is usually accomplished without much difficulty.

5 Surgical exploration seems the advisable procedure in cases of repeated hemorrhage when there is no evidence

of blood dyscrasia or of hepatic or splenic disease. In practically all such cases the bleeding is explainable on the basis of an intrinsic gastrointestinal lesion.

In a subsequent communication, the authors carry the analysis further (Arch. Int. Med. 50 621 (Oct) 1932). The incidence of the various intrinsic lesions is shown in the accompanying table.

TABLE II
INCIDENCE OF LESIONS

Lesion	No	Per Cent
Duodenal ulcer	356	59.20
Gastric ulcer	43	7.10
History of gastric ulcer, but roentgenologically negative	22	3.60
Secondary ulcer	92	15.30
Carcinoma of stomach	84	13.80
Adenoma of duodenum	1	0.16
Myoma of stomach	1	0.16
Gastric syphilis	1	0.16
Cholecystoduodenal fistula	2	0.32

The relative frequency of intrinsic lesions as compared to other causes of hematemesis is shown in Table III.

TABLE III
RELATIVE FREQUENCY OF INTRINSIC GASTRO-DUODENAL LESIONS AS COMPARED TO OTHER CAUSES OF HEMATEMESIS

Lesion	No	Per Cent
Ulcer	513	76.80
Carcinoma	84	12.60
Other benign lesions	5	0.83
Other causes	67	9.65

In discussing bleeding peptic ulcers, the authors take exception to the statement that duodenal ulcers usually cause melena and not hematemesis when they bleed. Anterior wall duodenal ulcers are less likely to bleed profusely than ulcers of the posterior wall, which occur in a more vascular area. Three types of vessel injury may be immediately responsible for bleeding: (1) a moderate sized or large vessel may be penetrated

as a direct result of ulceration. These vessels are frequently sclerotic. This type of hemorrhage is usually profuse and the blood is bright red when vomited, (2) a group of small congested vessels may surround the inflamed area and bleed or ooze slowly, usually resulting in melena, but occasionally in hematemesis, (3) the vessels in the granulation buds in the ulcer itself may be injured and bleed profusely.

The more common exciting factors of bleeding from these lesions are excessive physical exertion, acute infection, alcohol, fatigue or emotional strain, and hypersensitive types of reaction.

In the present series, bleeding duodenal ulcers appeared 8 times as frequently as gastric ulcers which approximates the percentage incidence of these two lesions. Ninety-two cases of secondary peptic ulceration were present in the series. Cases which had previously had bleeding ulcers seemed more subject to hemorrhage during a recurrence following operation, either from the original ulcer or from a secondary ulcer. There were 34 cases of gastrojejunal ulcer in the series. It was noted that in these recurrent ulcers a careful history often aided in localizing the lesion. In cases of reactivation of the original ulcer, the location of the pain was identical. However, the pain from a marginal or jejunal ulcer was likely to be to the left and below the original site.

There were 22 cases in the series which historically suggested peptic ulcer but in which x-ray confirmation was lacking. A few of these cases were operated upon and showed a superficial mucosal lesion which might not give x-ray evidence. Extreme irritability of the duodenal bulb, however, may be a suggestive sign, according to Kirklin.

The authors believe that duodenitis or shallow inflammatory lesions explain a large portion of the so-called indeterminate cases of hemorrhage. This is an assumption difficult to disprove.

In a survey of the causes of diffuse hemorrhage from the stomach, E. L. Bortz (Arch Int Med 50 1 (July) 1932) includes the following comprehensive outline:

MOST COMMON CAUSES OF GASTRIC HEMORRHAGE.

- A Neoplasms
 - Carcinoma.
 - Polypi
- B Ulcers
 - Acute.
 - Subacute and progressive
 - Chronic
- C Infections, acute or chronic (may cause either a local ulcer or a diffuse gastritis)
 - 1 Intraabdominal (colitis, enteritis, gastritis)
 - Appendicitis
 - Disease of biliary tract
 - Tuberculosis
 - Typhoid
 - 2 Extraabdominal
 - Scarlet fever
 - Yellow fever
 - Measles
 - Cellulitis
 - Pneumonia
 - Diphtheria
 - Endocarditis
 - 3 Disease of upper respiratory tract
 - 4 Pelvic disease
 - 5 Alcoholism
- D Systemic diseases
 - 1 Cardiovascular
 - Heart failure
 - Endocarditis
 - Thromboses or emboli
 - Hypertension.
 - Aneurisms
 - Ruptured varices
 - Esophagus
 - Rectum and anus (especially)
 - 2 Blood dyscrasias
 - Leukemia
 - The purpuras

- 3 Renal disease
- 4 Cirrhosis
- 5 Syphilis
- 6 Allergy (urticaria)

E Corrosion

From ingestion of poisons, as chloride, iodine, lye, etc

Other types of gastric bleeding not listed above have been described and are listed by the author under the following headings with case reports:

- 1 Diffuse gastric hemorrhage due to physical or emotional strain.
- 2 Profuse hemorrhage from superficial defects in the mucosa.
- 3 Hemorrhage from a porelike opening into one of the gastric vessels
- 4 Hemorrhage from multiple minute erosions
- 5 Capillary oozing
- 6 Hemorrhagic gastralgia.
- 7 Diffuse bleeding as a recurrence after operation for ulcer

Thirty-six additional cases illustrating these types of bleeding were culled from the literature. An analysis of the symptoms of 52 cases studied revealed complaints not unlike those found in other organic and functional gastrointestinal diseases:

- 1 Hematemesis, single or recurrent, profuse or moderate, with or without shock
- 2 Gastric pain
- 3 Epigastric tenderness
- 4 Distress after eating
- 5 Chronic indigestion.
- 6 Nausea.
- 7 Vomiting
- 8 Hiccups
- 9 Flatulence
- 10 Melena.
- 11 Constipation.
- 12 Headache

Many theories have been advanced to explain the etiology and pathogenesis of this condition. Anatomically the extensive capillarity of the stomach with a covering of only a single layer of epithelium facilitates diffuse hemorrhage. Anything that increases the congestion

or induces trauma, may be the inciting cause, such as, vomiting, venous stasis, increased intraabdominal pressure, mental excitement, trauma from external irritants such as food and toxins, destruction of epithelium due to disordered metabolism, allergic phenomena, endocrine disturbances, and disturbances of blood chemistry

Diagnosis.—Diagnosis of diffuse hemorrhage from the stomach is based on the following factors, according to Bortz (*Ibid*)

- 1 It occurs in young adults (20 to 40 years).
- 2 There is a preponderance of females over males (4 1).
- 3 The evolution may be silent, or nearly so, with hematemesis the first symptom
- 4 The patient may have had good previous health with no gastric symptoms
- 5 There may be a period of several months or a year or more between attacks
- 6 The condition may be present as a recurrence after operation for gastric or duodenal ulcer.
7. The symptoms are probably less severe than those in cases of true ulcer.
8. The x-ray picture of the gastrointestinal tract is usually negative
- 9 Gastroscopy may be of value in determining the type of lesion.
- 10 Very often, subsequent to the hemorrhage, all pain and discomfort ceases, which could hardly be the case if active ulceration were in progress

Treatment.—Three stages of treatment are outlined by Bortz (*Ibid*)

1 In the treatment of *shock*, external heat and rest with the use of morphine are indicated. Transfusion is recommended if the red cell count drops below 1,000,000.

2 Hemostatics may be of use. The author has had success with liquid extract of *Ceanothus americanus*; 1 to 2 teaspoonfuls 3 or 4 times a day, and extract of *Capsella bursa-pastoris*, 15

drops, 3 times a day. Normal horse serum and the patient's serum 2 to 10 cc may be tried. Soper has recommended gastric lavage with cool tap water. Operation is contraindicated.

3 After cessation of hemorrhage, convalescence may be aided by jejunal tube feeding. Blood regeneration may be aided by the use of liver extract and iron. Focal infection must be removed, and adequate rest, local and general, must be obtained. Atropine may be used to lessen spasm and secretion. Alkalis other than sodium bicarbonate are recommended, since the latter tends to produce hypersecretion. Calcium gluconate and parathormone are indicated in calcium deficiency. Sedation is often necessary.

STRABISMUS.—TREATMENT

—L C Peter (Arch Ophth 6 380 (Sept) 1931) discusses advancement and other muscle-shortening operations for concomitant squint and concludes as follows. In squints of 10° or less, a resection or tucking operation is indicated, for 15°, advancement of 1 muscle with recession of its opponent if necessary, for 20°, advancement and recession, for from 25 to 30°, double advancement, combined with recession if necessary, for 30° or more, double advancement with recession, in one or both eyes. He reminds us that all operations are from 20 to 30 per cent more efficient on the interni than on the externi muscles.

A single scleromuscular suture in Jameson's recession operation for squint is recommended by M Lombardo (Am J Ophth 15 523 (June) 1932)

After exposing the muscle in the usual procedure the tendon is severed, and the point of recession is marked on the sclera. This indicates where the muscle must be reattached. The needle of the upper end of the double-armed catgut suture is inserted in the sclera

at about 1 mm below the chosen point and comes out at about 1 mm above the horizontal meridian running in an oblique direction forward and upward. The same needle is now passed through the muscle from its conjunctival side about 2 mm above its middle horizontal line, close to the clamp and then through the muscle from its scleral side near its upper margin and then again under the superficial fibers of the sclera in line with and about 6 mm vertically above the chosen scleral point.

The lower end of the suture is placed in the lower half of the muscle and under the superficial fibers of the sclera in the same way below. The forceps are removed. The muscle is then approximated to the new position. The 2 needles are passed under the conjunctiva and through it near the cornea about 2 mm apart and tied outside. The conjunctival wound is closed with interrupted silk sutures.

SYPHILIS.—During the fiscal year just ended, the State Health Officers of 43 states reported to the Public Health Service, slightly more than 250,000 cases of syphilis (Health News, J-11 (Mar 11) 1932).

Increasing importance is being attached to the early diagnosis and treatment of syphilis. The possibility of extending to rural and remote districts the advantages to be derived from early diagnosis by means of microscopic examination were studied and one method was worked out. This method has been tested by other observers, and at present is in operation by one State Health Department and is under consideration by others.

A special study of syphilis among negroes in rural areas in cooperation with state and local health authorities, inaugurated in 1929 with the financial assistance of the Julius Rosenwald Fund, was extended to include areas in 5 other states. A total of 28,195 negroes were serologically tested, and of this number, 5785, or 20.5 per cent, were found

syphilitic on the primary survey. Of these positive cases, approximately 75 per cent were placed on intravenous medication.

EXPERIMENTAL SYPHILIS.

—*Spirochetosis* and experimental syphilis has been investigated by S M Fried and S S Orlov (Arch Dermat and Syph 25 893 (May) 1932), who state that spirochetosis is an autonomous disease found in rabbits (and probably in the field hare). The infection is caused by *Spirochæta cuniculi* and is transmitted from animal to animal by genital contact only, leading to a chronic disease of the skin in the anogenital region (in females, of the mucosa) and sometimes also of other parts of the body. The process is sometimes accompanied by a regional adenopathy. The occasional presence of spirochetes in the tributary lymph nodes and also in the blood, previously reported by others, was not confirmed in the authors' studies. The Wassermann and Sachs-Georgi reactions are, as a rule, negative in spontaneous spirochetosis. Animals cured of spontaneous spirochetosis are susceptible to new infections. *Spirochæta cuniculi* causes no specific lesions in the viscera or in the central nervous system. Likewise, the cerebrospinal fluid in this disease shows no cytologic or chemical changes. Spontaneous spirochetosis is a local parasitic disease of the skin which may be generalized in rare instances. It is believed that, in spite of the morphologic identity of *Spirochæta cuniculi* and *Spirochæta pallida*, their biologic properties and the processes that they cause are entirely different. The two diseases can be differentiated by clinical and laboratory tests. In difficult cases the therapeutic test with bismuth or arsphenamine may be a reliable guide in the differential diagnosis. This study has revealed

(as others have also observed) that, not infrequently, apparently normal rabbits show changes of the viscera, central nervous system and cerebrospinal fluid which resemble those seen in advanced syphilis in man. The results obtained from the study of the syphilitic disease of these organs in the rabbit must, therefore, be accepted with reservations.

PATHOLOGY.—The examination of 145 lymph nodes excised from patients with early untreated syphilis has been made by H. E. Michelson (*Ibid.* 25:457 (Mar) 1932). In approximately 27 per cent of the specimens *tuberculoid structure* was present. The test with tuberculin, performed on 14 patients whose lymph nodes showed tuberculoid structure, was positive 7 times. The luotest was negative when performed on 9 patients whose lymph nodes showed tuberculoid structure. Tuberculoid reactions found in the lymphatics in early syphilis are variable in type, and apparently the state of allergy is not the same as when this reaction is found in the skin. True gummas of the lymph nodes differ from the tuberculoid structure found in the nodes in early syphilis.

The relation between *frambesia* and *syphilis* is considered of great importance by O. Schöbl and C. M. Hasselmann (*Arch. f. Schiffs u. Tropen-Hyg.* (Beihft 2) 36.1, 1932) because *Spirochaeta pertenuis*, the pathogenic organism of frambesia, is identical with *Spirochaeta pallida*, the pathogenic organism of syphilis, in regard to morphology, staining and culture. The main difference between the two types of spirochetes is in their biologic behavior in the body tissues. The pathogenic organism of frambesia is ectodermotropic, *i.e.*, it has an especial affinity for the external layers of the skin. The patho-

genic organism of syphilis, however, affects all organs, but it shows a particular affinity for the mesodermal tissues, and therefore can be considered as mesodermotropic. This difference in tropism explains the difference in the pathologic changes and immunizing behavior, and thus also the differences in the clinical course and in the epidemiology of the two diseases, as well as the fact that one disease attacks primarily certain age groups, and, finally, hereditary and congenital infections in syphilis and their absence in frambesia.

The largest portion of the treatise consists of a report on studies of the immunity conditions. It is emphasized that frambesia should not be designated as tropical syphilis, and it is also pointed out that the two diseases may concur. The possibility is considered whether, perhaps, the use of vaccines may be an aid to chemotherapy and may perhaps increase the immunity in those who have been treated during the early stages, and thus prevent reinfection.

DIAGNOSIS.—*Occult syphilis* is defined by U. J. Wile (*Bull. Johns Hopkins Hosp.* 51:102 (Aug) 1932) as that form of infection, the lesion of which does not reach the clinical horizon. It may possibly be as well spoken of as the subclinical manifestations of the disease. By this it must not be assumed that the subclinical manifestations are in any way less serious than those which present themselves as clinical entities. On the contrary, in many cases the subclinical manifestations may constitute the majority portion of the morbid processes and may be the salient factors in the prognosis of the given case. Their recognition is essential to its proper management.

Of great interest in connection with the occult nature of syphilis in women

is the large group of cases in which no manifestations of the disease have been recognized and in which clinical examinations fail to reveal preexistent or existent causes for a positive biologic reaction. Such are the cases of syphilis occurring in many women in whom the infection existed in the husband in a latent or partially treated case of some duration before marriage. It is the present custom to regard all such cases as potentially dangerous and requiring as energetic treatment as if the infection were seen as a fresh case from the outset. Such a procedure is probably wise, but it cannot be gainsaid that the majority of these patients, if untreated, could go through many years of apparently normal existence, carrying no sign of the disease other than that which occurs in the blood.

In view of the well-known mimicry of syphilis, the diagnostic problem is often delicate. This is particularly true in cases of syphilis presenting hepatic disease, gastric disease, splenic anemia, hyperthyroidism and aortic regurgitation. Few cases of nephritis can be shown to be related to coexisting syphilis, syphilis and hypertension, when related, are more apt to be casual than causal, and this is true also of diabetes. Occult syphilis has been shown to be a factor of importance in the development of carcinoma when this occurs in squamous epithelium, but is apparently unrelated when malignant neoplasms develop from columnar epithelium.

The *Kline finger blood precipitation test* for syphilis has been studied by J. J. Eller and C. R. Rein (*Arch Dermat and Syphil* 25:239 (Feb.) 1932). For comparative study, 545 specimens of blood were obtained from the finger and defibrinated for this test. At the same time, a larger quantity of blood from

the arm was obtained to furnish serum for the Wassermann, Kahn and microscopic slide precipitation tests. Furthermore, in 280 cases, sufficient defibrinated finger blood was obtained for additional heated serum slide tests. Fifty-nine per cent of the blood specimens were obtained from patients with proved cases of syphilis. The evaluation of the results of this comparative study was made according to the method of Kahn as follows: positive reaction, 4 plus, 3 plus and 2 plus; doubtful reaction, 1 plus and plus or minus, agreement, positive or negative by both methods, relative agreement, positive or negative by one method and doubtful with the other.

It was found that the Kline finger blood test was more sensitive than the Wassermann and Kahn tests and as sensitive as the heated serum microscopic slide precipitation test. No false positive reaction occurred in any of the tests in this series. The finger blood test gave results that agreed more frequently with the clinical condition of the patients than those of the Wassermann and Kahn tests. Since this test requires but a small amount of easily obtainable finger blood, it is particularly useful in the diagnosis of syphilis in infants, children and obese patients in whom venipuncture is difficult. It is also useful in checking the suitability of blood donors immediately before transfusion. In addition, it may be used as a method for the immediate diagnosis of syphilis in a dermatologic clinic.

Muller's simplified flocculation test for syphilis was used in 300 cases by L. Hessel (*Polska gaz lak* (Feb. 21) 1932). He tested 180 serums and 120 spinal fluids. The Wassermann reaction served as a control. While his report is preliminary, it is in agreement with the opinions of other investigators, *viz*,

that the reagent is highly specific and sensitive, and also convenient for clinical and private practice, because no special equipment is needed for the relatively quick diagnostic test. The time for reading is 3 and 24 hours for serums and spinal fluids, respectively.

The *flocculation test* for the serodiagnosis of syphilis has been investigated by C. L. Ducco (Prensa méd argent 18 1552 (Apr 20) 1932) on the blood serum of normal and syphilitic persons. He concludes that the blood serum of syphilitics contains an albumin or albuminoid which does not exist in the blood serum of normal persons. The syphilitic albumin produces a lecithin-albuminoid which is precipitated itself, under certain circumstances. The isoelectric hydrogen ion concentration (isoelectric point) of the syphilitic albumin is 7.9. Flocculation tests (and probably the Wassermann test also) aim to detect the presence of this albuminoid in the serum under examination. The nearest to 7.9, the hydrogen ion concentration of the medium (antigen emulsion) by means of which the determination of the syphilitic albumin is made, the most sensitive the method and the most exact the results obtained. The author advises the use of the following antigen and technic.

As normal antigen the following should be used: chemically pure lecithin, 0.5 Gm., cholesterol, 0.7 Gm., alcohol, 100 c.c. The emulsion of the antigen is made up with 4 volumes of distilled water and 1 volume of the antigen. The water is poured into an Erlenmeyer flask and the antigen is added drop by drop while the flask is continuously shaken. A normal solution of sodium citrate is prepared separately, thus: pure citric acid, 70 Gm., distilled water, 500 c.c., and 10 drops of a 1 per cent alcoholic solution of phenolphthalein. This is dissolved and to it is added some concentrated solution of sodium hydroxide, in sufficient amount to bring the

solution to the initial point of coloration with the phenolphthalein. As it is indispensable that the solution has a hydrogen ion concentration not beyond 8.5, as soon as the initial point of coloration with the phenolphthalein appears, a weak solution of citric acid should be added, drop by drop, until the red hue of the phenolphthalein is slightly perceptible. The solution is allowed to cool, and distilled water is added to make a volume of 1000 c.c. To this solution is added 1 or 2 c.c. of chloroform to avoid any possible contamination by molds or bacteria.

The following amounts are necessary to perform the test: blood serum, 1 c.c., suspension of the antigen at one-fifth concentration, 1 c.c., normal solution of sodium citrate, 1 c.c. The mixture is kept at 37° C., and turbidity is observed in the liquid (in which flocculation has taken place) in a photometer or in a spectrophotometer. One subtracts from the reading of the density obtained the density of a control test made with the same technic as that used in the test, but by using distilled water in place of the antigen emulsion.

By the above technic a reaction of flocculation with tendency to conglomeration is obtained. Between the optic density obtained by this test (which density was estimated with Crova's polarization spectrophotometer) and the Wassermann test (which was performed according to the technic of Bauer and Hoechst, with inactivated serum and normal antigen in a concentration of 9 to 1), the following correlation in the results was observed: from 0 to 0.10 in the scale of the optic density, no Wassermann reaction was observed; from 0.10 to 0.20, one-fourth in the intensity of the Wassermann reaction; from 0.20 to 0.30, one-half intensity; from 0.30 to 0.45, three-fourths, and more than 0.45, entire intensity of the Wassermann reaction.

Murata's ring test in the serodiagnosis of syphilis has been studied by O. N. Zepalova (Sovet vrach gaz p 149 (Feb 15) 1932). The antigen is a cholesterolized extract of ox heart, pre-

pared according to the method of Nagayo and Nobechi. In summary, the test consists of layering small quantities of inactivated serum with titrated antigen which has been diluted with physiologic solution of sodium chloride (1:10) and mixed for 10 minutes not earlier than 1 hour previously. The test is read after 45 minutes and again after 2 to 3 hours, it is considered positive when there is a white ring at the point of contact of the serum and antigen. The author examined 1244 serums by this method, checked by the Wassermann and also one other test, these included serums from persons with undiagnosed syphilis and other conditions (pregnancy, chancroid, gonorrhea, tuberculosis). In 95.82 per cent (534 positive and 658 negative) this test coincided with the recognized tests for the diagnosis of syphilis. The author concludes that the test is highly specific and is comparable to the Kahn and the Wassermann test.

The *serodiagnosis* of syphilis has been brought to a high point of efficiency and that it has reached a certain finality is the opinion of E. Meinicke (München med. Wchnschr. 79:375 (Mar. 4) 1932). He thinks that differences in the reactions of various tests are only quantitative, *i. e.*, relative. If they appear to give contradictory results, this is only because a test is less definite. For practical purposes, *i. e.*, as a foundation for diagnosis and as a guide in therapeutic measures, the author recommends the modern precise *flocculation reactions*.

Positive seroreactions for syphilis following injection of *diphtheria serum* is pointed out by C. Stern (*Ibid.* 79:583 (Apr. 8) 1932) to have been reported since 1929. On the basis of these reports, the possibility of a positive syph-

ilis reaction after serum treatment cannot be doubted, but the author advises precaution in the interpretation of such observations.

As early as 1920, he had pointed out that certain cases have to be differentiated from syphilis, which apparently are likewise caused by spirochetes, such as by oral spirochetes or by the spirochetes of balanitis, but not by *spirochæta pallida*. He observed cases with diphtheria-like symptoms, such as fever and painful throat, which had been diagnosed as diphtheria, but in which bacteriologic examination proved this diagnosis incorrect. These cases, in which serum treatment had not been resorted to, often gave a positive syphilis reaction, which disappeared again spontaneously. Positive syphilis reactions were also observed following Vincent's angina. The author warns against the overvaluation of serologic tests, because positive syphilis reactions may be observed after throat infections, whether diphtheria serum has been administered or not. As a rule, these positive reactions disappear spontaneously, however, he thinks it possible that they may persist for longer periods if infectious foci remain in the tonsils.

In his review of the relation of the value of *sedimentation reaction* in dermatovenereology and the most important dermatologic disorders, P. L. Rotnes (Norsk mag. of lægevidensk. 93:280 (Mar.) 1932) shows that while the reaction does not play a significant part in dermatovenereology, it may occasionally be of help both in differential diagnosis and in therapy and prognosis.

Errors in diagnosis and treatment of syphilis are cited by A. W. Cheever and W. D. Wheeler (New England J. Med. 205:1249 (Dec. 24) 1931) who conclude with the following facts:

1 Consider every genital ulcer as syphilitic unless definitely ruled out by repeated dark-field examinations

2 Remember that extragenital chancres are not uncommon and may be located anywhere on the body

3 Bear in mind that a chancre in a woman may be hidden within the vagina. A painstaking, thorough search should be made in all cases

4 Have routine laboratory blood tests, such as the Wassermann and Hinton, made on the blood of all your patients, and don't forget that one negative test does not rule out syphilis

5 Have the blood of every pregnant woman examined for syphilis early in pregnancy. A positive blood test would indicate immediate treatment for the expectant mother and incidentally for the fetus

6 The time to discover a congenital syphilitic and begin treatment is before the syphilitic is born, that is, treating the syphilitic mother early in pregnancy, all through pregnancy, and then continuing the treatment of the child from its birth for a long number of years

7 Treatment in all cases of syphilis should be prolonged, intensive when necessary, and always in keeping with modern procedure and progress. One negative blood test during treatment does not mean a cure. About 2 to 5 years are necessary before a probable cure can be effected. In most cases, lifetime observation of the patient is advisable

8 Examination of spinal fluid is essential in every case of syphilis, and is often the only means of detecting incipient neurosyphilis

9 Always suspect syphilis. In any of its stages it may simulate other diseases

10 Whenever in doubt concerning the diagnosis of syphilis, consult a syphilologist

Cutaneous Manifestations.—The characteristics of late syphilis of the skin are enumerated by J. C. Matthews (West Virginia M J 28.149 (Apr) 1932) as follows: (1) solitary, or at most few lesions, (2) asymmetry, though by no means invariable; (3) induration, deep palpable infiltration; (4) indolence, a relatively low-grade inflammatory process; (5) arciform configura-

tion, the borders being polycyclic or forming segments of circles, both in the individual lesions and in the group of lesions, (6) sharp margination, punched-out appearance in ulcers, (7) tissue destruction and replacement without ulceration, (8) tendency to central or one-sided healing with peripheral extension, (9) scar formation—superficial, atrophic and noncontractile scar retaining the arciform shape of the original lesion, and (10) peripheral hyperpigmentation of rather persistent character. No one of these 10 individual items can be accepted alone, but the combination often becomes an element of great value and should be carefully considered in interpreting the Wassermann reaction

A group of 100 cases, in which a diagnosis of late cutaneous syphilis had been made on the average of 10 years before the time of the survey, and reexaminations carried out following intensive treatment, have been reported by P. A. O'Leary and J. R. Rogin (Am. J. Syphil. 16 98 (Jan) 1932). Among the 100 cases, evidence of syphilis was encountered in the viscera or nervous system in 45 patients. But more significant was the observation that these visceral manifestations of the disease were usually of a mild type, the exception being 2 cases of hepatitis with cirrhosis. A similar observation was made in the group in which serologic or clinical signs of neurosyphilis were manifest. In 17 of 24 cases, the serologic tests were reversed to negative, in 4 of them the reversal was spontaneous. In 3 of the cases in which reversal did not take place, the serologic tests remained weakly positive, in the remaining 4, the present status is unknown. The authors have seen 6 cases of neurosyphilis in which cutaneous gummas developed following malarial treatment, in all with

decided clinical and serological improvement

TREATMENT.—The contrary *therapeutic and sex relationship of syphilis and tuberculosis* has been discussed and summarized by W F Petersen and R Hecht (J A M A 99 108 (July 9) 1932) as follows. the established therapeutics of tuberculosis and of syphilis is antithetical. The alteratives, in which category nonspecific therapy may be included, used in dosages followed by catabolic effects, are effective in syphilis but harmful in tuberculosis

The biologic changes incidental to the female sex cycle have a corresponding contrary effect in these infections. Tuberculosis in the female is more malignant, syphilis generally more benignant, the reasons being found in the enhanced inflammatory reaction of the premenstruum.

The sex liability of the tuberculous patient finds clear expression in the mortality curve, while the relative protection of the syphilitic female is demonstrated in the greatly lessened incidence of neurosyphilis. Fundamentally, of course, the difference in the ultimate clinical effect of the identical biologic cycle lies in the ability or disability of the tissues and fluids of the body to dispose of the virus which is disseminated when premenstrual activation of localized lesions takes place.

Early syphilitic persons are treated by N B Heller (J M Soc New Jersey 29 377 (May) 1932) with weekly injections of a bismuth preparation, giving them a course of 12 injections. This is followed by 8 weekly injections of 0.3, 0.45 and 0.6 Gm (5.7 and 10 grains) of neoarsphenamine, depending on the patient's weight. A watch is kept on the general condition, especially the heart and kidneys, by periodic

urinalysis. If there are no contraindications, this treatment is kept up for 1 year without any rest periods. With the aid of the social service department, an earnest effort is made to get in touch with all contacts, and they are examined both physically and serologically, and treatment is instituted when necessary. The second year, 2 courses of treatment are given, with rest periods, and periodic serologic examinations after each rest period. When blood reports are repeatedly negative, the patient is referred to the medical clinic for a heart examination and to the eye clinic for an ophthalmoscopic examination. After a rest of 6 months, another serologic examination is performed, this time including a spinal tap with a cell count, a Pandy reaction, a Wassermann test and a colloidal gold curve report. It is only after all these reports are negative that the patient is discharged, with instructions to come once a year for a check-up.

The results of treatment by inoculation with the spirochetes of rat-bite fever (*Spirochæta morsus-muris*) have been reported by Hashimoto and I. Iwakiri (Rev franc de dermat et de venerol 8 131 (Mar) 1932) in 13 cases of primary syphilis. While they admit that their material is insufficient for a definite judgment of this therapy, they conclude that primary syphilis may be completely cured by inoculation of rat-bite fever, without other treatment. The patients were inoculated intramuscularly with spirochetes obtained from the blood of guinea-pigs that had been inoculated with cultures of the organism. The rat-bite fever, which develops after an incubation of from 6 to 16 days, may be intermittent or continuous. The rat-bite fever was cured by injection of arsphenamine after the second or third attack of fever. The quantity

used was as small as possible (from 0.3 to 0.4 Gm—5 to 6 grains—every 3 to 5 days, to a total of from 0.6 to 1.5 Gm—10 to 22½ grains) to avoid influencing the syphilitic treatment.

Inoculation of the rat-bite virus resulted in the disappearance of *Spirochæta pallida* from the chancre in the first days of fever even in cases in which a great many spirochetes had been observed previously. In 1 case the spirochetes disappeared from the chancre before the fever attack. Serum reactions (Wassermann, Meinicke and Murata) were practiced before and after inoculation, after each fever attack, and after each injection of arsphenamine. The serum became negative and remained negative in 6 of the 9 cases observed sufficiently long. In 2 of the others there was a decided decrease in the strength of the reaction. In the control case, in which an injection of arsphenamine was not given, the serum reaction was quite strong from time to time but became completely negative after 1 year. In discussing the disappearance of *Spirochæta pallida* from the chancre, the authors advance the idea that this may be due to the reproduction of *Spirochæta morsus-muris*, which is antagonistic to *Spirochæta pallida*, instead of being due to the fever caused by the rat-bite virus.

NEUROSYPHILIS.—Lissauer's *dementia paralytica* is discussed by H. H. Merritt and M. Springlova (Arch Neurol and Psychiat 27:987 (May) 1932), who review the clinical and pathological reports of 35 cases in the literature and add 8 personal cases. Their 8 cases were characterized *clinically* by a relatively long duration, the presence of apoplectiform and epileptiform attacks, often Jacksonian, and the appearance of localizing signs, such as hemiplegia and

aphasia. *Pathologically*, they all showed macroscopic atrophy, usually unilateral, of certain convolutions, generally in the temporal lobe and inferior parietal lobe. Microscopically, they were characterized by the presence of status spongiosus in the cortex and myelin loss in the white matter of the atrophic convolutions. It is shown that these lesions are not produced by the usual dementia paralytica process alone, and, on the basis of clinical and pathologic data, it is concluded that they are produced by a combination of functional disturbance of the circulation with the dementia paralytica process. It is pointed out that the usual distribution of the atrophy in these cases agrees with the distribution of the posterior branches of the middle cerebral artery.

It is also emphasized that there is nothing to separate sharply this type of case from the "usual" case of dementia paralytica. The differences would appear to be quantitative rather than qualitative. Functional disturbance of the circulation probably occurs in a much larger percentage of the cases of dementia paralytica than is represented by those diagnosed as Lissauer's dementia paralytica. Status spongiosus was found by Fischer in 10 per cent of cases of dementia paralytica, and it is probable that primary loss of myelin in the white matter would be found just as often if more thorough examinations were made.

DIAGNOSIS.—The myoclonic form of *cerebral syphilis* has been considered by R. Poinso, M. Legrand and R. Beaucaire (Gaz d hôp 105:165 (Feb 3) 1932), who report a case of cerebral syphilis which later evolved toward dementia paralytica, and which was accompanied by myoclonic attacks, hiccups and fever. These signs are seldom found in syphilis of the brain and often

lead to a mistaken diagnosis of a myoclonic form of encephalitis. The sudden attacks of myoclonia were characterized by very rapid contraction and relaxation of one or several muscles, projection under the skin of these muscles as if they had been stimulated by an electric current, no displacement of the extremity, variable frequency (from 10 to 80 a minute) and rhythmic, isochronous spasms. In contrast with myoclonia present in encephalitis, there was no attenuation of exacerbation by movement, agitation, or sedative therapy. The myoclonia persisted for 5 or 6 days at a time, and only a soporific caused it to disappear. It was not accompanied by pains, the involved muscles were not painful on pressure. Two days after the disappearance of the myoclonia, there appeared an attack of hiccuping that lasted 2 hours (diaphragmatic myoclonia). The authors compare their personal observation with 2 others reported in the literature. They believe that motor disturbances, particularly myoclonia, are of cortical and meningo-encephalitic origin—the cerebral cortex is irritated by a considerable thickening of the meninges.

Peripheral neurosyphilis affecting the left common peroneal nerve is stated by W. M. Sheppe and A. L. Osterman (Am J Syphil. 16 90, 1932) to be rarely observed. They discuss the *differential diagnosis* and report the case of a man 55 years of age who complained of numbness and weakness of the left foot. Examination revealed loss of sensory and motor function in the distribution of the common peroneal nerve. The patient gave a history of chancre 36 years previously and his spinal fluid showed a positive Wassermann reaction. A diagnosis of syphilitic peripheral nerve neuritis was made.

Conservative *antisyphilitic treatment* was promptly followed by improvement.

The diagnosis of neurosyphilis, as stated by R. S. Hubbs (M Bull Vet. Admin 8 295 (Apr) 1932), may be confirmed at the time the first symptoms appear, in the vast majority of cases, by neurologic changes which are present. In the making of a diagnosis of neurosyphilis in the early stages of the disease, a physician is aided by the fact that many such patients have positive blood Wassermann and Kahn reactions. Yet he must not consider neurosyphilis ruled out by negative blood reactions, since 88 per cent of a group of patients studied by the author had negative blood Wassermann or Kahn reactions at or near the time of onset.

Abnormalities of the pupils and iris in neurosyphilis are discussed by W. M. McGrath (J Ment Sc 78 362 (Apr) 1932), who states that the pupillary phenomenon originally described by Argyll-Robertson is a complex one and consists invariably of the following components when it is fully developed, loss of the direct and consensual response to light, retention (not invariably of normal degree) of the response to convergence, trophic changes in the texture and color of the iris, and abnormalities in the dimensions (miosis) and in the form of the pupil. No one of these components is more constant than another, and no one of them is separable from the rest. This, the true *Argyll-Robertson pupil*, is invariably associated with neurosyphilis and is never found apart from that condition. The Argyll-Robertson phenomenon commonly develops segmentally, becoming uniform only when fully developed. It is to this segmental development of iris changes that segmental loss of light reaction and pupil irregularity are due. This mode

of development indicates that the underlying nervous lesion must be in the peripheral neuron. Observations recorded by the author are not compatible with a central lesion in the midbrain. The so-called Argyll-Robertson pupil of non-syphilitic lesions of the nervous system is clinically distinguishable from the true Argyll-Robertson pupil. It is accompanied by pupil dilatation and is characterized by the absence of miosis, pupil irregularity or atrophic changes in the iris. Theories as to its pathogenesis have no bearing on the problems presented by the true Argyll-Robertson pupil.

Syphilis of the eighth nerve occurs in 2 chief forms, according to W. A. Garrott (J. Tennessee M. A. 25:95 (Mar.) 1932), *neurolabyrinthitis syphilitica*, or early auditory syphilis, and *labyrinthitis syphilitica tarda*, or late auditory syphilis. While neurolabyrinthitis syphilitica responds favorably to treatment in the majority of cases, in labyrinthitis syphilitica tarda, the response is not always so good, many of the cases, however, are checked or stopped in their progress. The author believes that syphilis of the eighth nerve or its branches is more common than the diagnostic records of most otologists would indicate. If diminished bone conduction is just ground for suspicion of syphilis of the eighth nerve and its branches, and if it is an early manifestation of nervous system syphilis, otologists should be more alert and watch for it more carefully. Though not all the auditory symptoms may be relieved, the clinician is obliged to recognize the systemic nature of the infection and cooperate with competent serologists in its treatment. By the same token, the serologist and the general practitioner should remember the possibility of eighth nerve involvement and

consult the otologist. And he should attempt to outline his treatment according to the degree of involvement as determined by the otologist.

TREATMENT.—Intravenous injections of **atropine sulphate** in the treatment of *tabetic gastric disturbances* has given T. Alajouanine and A. Horowitz (Bull. et mém. Soc. méd. d. hôp. de Paris 48:178 (Feb. 15) 1932) almost constantly favorable results in 30 cases. The treatment consists of the injection intravenously of from 1 to 3 mg ($\frac{1}{65}$ to $\frac{1}{20}$ grain) of atropine sulphate, once or twice daily, for several days. The group studied included patients with sensory and sensory-motor gastric disturbances, sometimes with the sympathetic system, sometimes with the vagus nerve predominating, the attacks were brief, from 3 to 4 days, or prolonged from 2 to 3 weeks. In some patients, the fulgurating pains that accompanied the gastric disturbances also disappeared or were calmed after treatment. They did not find any contraindications to the treatment. In most patients, the improved condition lasted from 1 to 3 years. Recurrences were again treated.

The intracisternal serum treatment of neurosyphilis is believed by H. R. Viets (New England J. Med. 206:491 (Mar. 10) 1932) to possess distinct advantages over other modes of therapy. The pain and sphincter weakness, often noted after intraspinal treatment, are avoided. By a careful checking of the tests in the cerebrospinal fluid each time an injection is made, the amount of treatment necessary to bring the spinal fluid to normal and the general prognosis of the case can be accurately gaged. The method may be used as an office procedure, thus keeping the patient at his normal occupation. The results ob-

tained are better than with most other forms of treatment, especially in selected cases. Often, rapid changes take place in the spinal fluid as the result of intracistern serum and as much is accomplished in a few months as is usually achieved in a few years of intravenous treatment. The technic is not difficult to learn, but there are distinct dangers from the method in the hands of a careless operator. Treatment should be given not oftener than once in 2 weeks and should be continued until the spinal fluid has approached normal or is in its normal state.

Malaria or some other method of fever therapy is considered by A. Paige, R. J. Rickloff and E. D. Osborne (New York State J. Med. 31:1441 (Dec. 1) 1931) to be a valuable adjunct in the treatment of neurosyphilis. From a study of the literature and from their own experience, they believe that the ideal time for malaria therapy is from the second to the sixth year of infection. The percentage of serologic cures will gradually decline in proportion to the duration of the infection. Malaria therapy should be preceded by adequate **arsphenamine** and **bismuth** therapy to the extent of at least 2 or 3 full courses and followed likewise by **arsphenamine**, **bismuth** compounds or **tryparsamide** as indicated. With a thorough understanding of the applications and limitations of malaria therapy, it is a safe and efficient method of treatment.

SYPHILIS, CONGENITAL.—MODE OF INFECTION.—Sarbo (Budapest Correspondent J. A. M. A. 98:2004 (June 4) 1932), in a symposium on congenital syphilis, advanced a new theory in regard to the mode of infection of the disease. According to

Sarbo, there are individuals whose lymph nodes and lymphatic systems are so constricted that they prevent the spirochetes in their bodies from reaching the blood stream. In such persons, infection does not take place through the blood stream and consequently skin manifestations do not appear. This theory also explains why lesions of this type are missing in cases of congenital syphilis in which *tabes* and *dementia paralytica* make their appearance.

TRANSMISSION TO THIRD GENERATION.—According to J. Guszmann (*Ibid.*), the chance of transmission of congenital syphilis to the third generation is small, since even in the absence of treatment the infectivity of the disease disappears in the course of years. By the time the patient with congenital syphilis has reached the age of 18 to 20 years, the danger of infection may be regarded as *null*. Moreover, the negative possibility of infection is 100 per cent certain if the woman with congenital syphilis is subjected to antisyphilitic treatment during pregnancy.

However, both J. Guszmann and E. Tudos (*Ibid.*) have seen cases of transmission of the disease to the third generation.

ETIOLOGY.—Neurotrophic Strain.—Sarbo (*loc. cit.*) observed a series of 46 syphilitic parents and their children which he divided into 3 classes: (1) syphilitic parents without *tabes* or *dementia paralytica*, (2) *tabetic* parents, and (3) parents with *dementia paralytica*. Among the descendants in each of these groups could be found all the manifestations of syphilis. He concluded that the existence of a specific neurotrophic spirochete is false.

SYPHILIS AND PREGNANCY.—The serologic reactions to syphilis are demonstrable during pregnancy, in the

venous blood and also in the retroplacental blood, according to R. Spiegler (Munchen med Wchnschr 79 95 (Jan 15) 1932). In the material that he examined, the margin of error was only 0.45 per cent. He also found that in the blood of the umbilical cord of the newborn only the positive reactions are demonstrable, for a negative reaction does not exclude a congenital syphilis. Finally, pregnancy may cause a late provocation, which however, becomes serologically evident only during the puerperium. For the prevention and treatment of congenital syphilis, the author recommends the following: (1) either during pregnancy, but at the latest during delivery (retroplacental blood) all women should be subjected to a serologic test; (2) all women who have once had syphilis should receive anti-syphilitic treatment while pregnant, even if the Wassermann reaction is negative, (3) children from syphilitic mothers who did not receive sufficient treatment during pregnancy should receive prophylactic treatment as early as possible.

Syphilis was found in 1.21 per cent of 9800 pregnant women in an investigation made by E. J. Pye-Smith (J. Obst and Gynec Brit Emp 38 578, 1931) to determine the part played by maternal syphilis in the causation of fetal and infant death rate and the effects of antenatal treatment. The record of pregnancies among these women shows that abortion is not more frequent than in nonsyphilitics, whereas stillbirths are 5 times more common. Syphilis does the most harm in the later months of pregnancy and the early months of postnatal life. When a patient is found to have a positive Wassermann reaction, **anti-luetic treatment** is instituted at once and is continued until her last visit before being confined. Continued treat-

ment after delivery is also urged. In women so treated, the percentage of stillbirths was reduced to 3.6—(3 per cent being considered average), and the infant mortality during the first year of life was also greatly reduced. A positive Wassermann reaction became negative after 1 course of treatment in 45.83 per cent and after 2, 3 or 4 courses of treatment in 76.46 per cent.

SEROREACTIONS.—While it is often stated that negative serologic tests for syphilis do not necessarily eliminate the diagnosis of syphilis, it is seldom pointed out that a positive reaction does not always indicate a syphilitic infection.

C. Stern (Munchen med Wchnschr 79 583 (Apr 8) 1932) states that reports have been made of positive syphilitic reactions after the injection of diphtheria antitoxin. The author advises precaution in the interpretation of such observations. Certain cases, for example, must be differentiated from syphilis which apparently are likewise caused by spirochetes but not by the *Spirochæta pallida*. He observed cases with diphtheria-like manifestations that were diagnosed as diphtheria but were not verified by bacteriologic examination. These cases in which serum therapy was withheld often gave a positive serologic reaction for syphilis which disappeared spontaneously. Positive reactions were also observed following Vincent's angina.

While it is generally stated that a positive serologic reaction in the newborn infant means syphilis, E. C. Dunham (Am J Dis Child 43 317 (Feb) 1932) contends that an infant born of a mother with a positive Wassermann reaction is not necessarily infected with syphilis, even if the Wassermann reaction of the infant's blood is positive. A positive reaction on the cord blood and

on the infant's blood in the first few days or weeks after birth may be due, in some instances, not to actual infection of the infant, but to antibodies passing from the mother's blood through the placenta into the infant's circulation. If only 1 Wassermann test is done in such instances, or if proper evaluation is not given to repeatedly positive but weakening Wassermann reactions, then the infant may bear unnecessarily the stigma of a diagnosis of syphilis and may be unnecessarily treated. The author reported 14 of such infants with varying degrees of positive serologic findings but without clinical evidence of syphilis. Treatment was withheld in all cases and in all cases the Wassermann became negative. One infant, a premature, died, necropsy examination failed to reveal signs of syphilitic infection.

Diabetes.—S. K. Krapivin (Soviet Vestnik Venerol i dermat 1 247, 1932, J. A. M. A. 99 519 (Aug 6) 1932) states that syphilitic diabetes is not common. He reports a case of diabetes apparently due to congenital syphilis. Not only was the ulcerative lesion of the soft palate alleviated by antiluetic treatment, but the therapy, when combined with insulin treatment, resulted in improvement in the diabetic condition. No improvement was obtained with insulin and diet alone.

Epilepsy.—It is generally believed that congenital syphilis may be a direct or an indirect cause of the epileptic syndrome, some authors regard their occurrence together as merely coincidental.

K. A. Menninger and W. C. Menninger (J. Nerv. and Ment. Dis. 75 473 (May), 632 (June) 1932) feel that much of the published work on this problem is based upon inadequate diagnostic data. The crux of the problem is the definite diagnosis or exclusion of

congenital syphilis. This, the authors do not believe can be done upon the basis of the presence or absence of any single symptom or sign, or of several fixed and invariable symptoms and signs, but only upon the presence or absence of findings in carefully investigated hereditary, physical and chemical constituents of the individual which taken in association point to such a diagnosis.

Using such a standard, 31 cases were selected and presented having convulsions of the "idiopathic epilepsy" type which were recorded as being of congenital etiology. They conclude that congenital syphilis can produce convulsions, directly or indirectly, without the presence of gross brain lesion or encephalitis (juvenile paresis), and thus appear to be "idiopathic" epilepsy. However, from a statistical viewpoint, when compared with the total number of epileptics and the total number of congenital syphilitics, the occurrence of congenital syphilitic epilepsy must be regarded as unusual. The frequency, however, is not so important as the definite establishment of its occurrence.

Gumma.—Gummata of the lungs, according to K. Y. Ch'in (Chinese M. J. 46.53 (Jan) 1932), are rare in congenital syphilis. In the necropsy examination of a stillborn premature infant reported by the author, the principal lesions described were large, sharply circumscribed necrotic nodules 1 to 1.5 cm. in diameter, situated in the *spleen* and *lungs*. The lesions were of soft consistency and were composed mostly of necrotic lung and spleen tissue, the outlines of which contained numerous spirochetes. It seemed that these changes, which grossly resembled gummata, were the end-results of secondary infarction of areas of the lung and spleen.

TREATMENT.—(a) Prophylactic.—By the time a female child with congenital syphilis reaches the age of 18 to 20 years, Guszmann (*loc cit*) believes the danger of transmission of the infection to the third generation may be regarded as *nil*. Moreover, this negative possibility of infection, the author states, is 100 per cent certain if the woman with congenital syphilis is subjected to antisymphilitic treatment.

L Spitzer (Munchen med Wchnschr 79 97 (Jan 15) 1932) observed that of 158 syphilitic couples, 78 or 49 per cent remained sterile. The other 80 couples had 117 living children. Of these, 16 had syphilitic signs at birth and 101 were apparently healthy when born. However, only 14 of the latter group remained entirely normal. In view of these results, the author states that *syphilitic persons should not be permitted to have children*.

In order to make sure that syphilitic parents do not produce offspring, the author advises that if only the man is syphilitic, he should be subjected to **vasectomy**, so that the woman may remain fertile for a possible second marriage. If only the woman is syphilitic, she should undergo operative **sterilization**, and if both are infected, either one should be sterilized.

However, the prophylactic value of **prenatal antisymphilitic treatment** is emphasized by J. R. McCord (Am J Syph 16 78 (Jan) 1932). The author started antisymphilitic treatment as early in pregnancy as the diagnosis was made. The treatment consisted of the intravenous injection of 0.45 Gm (7 grains) of **neoarsphenamine** and of the administration of **mercury by inunction**. Pregnancy ended disastrously in 6 per cent of the treated cases and in 66.2 per cent of the untreated. Subsequent blood

Wassermann tests were negative in 71 babies whose mothers received 10 or more treatments and in 6 per cent of 174 babies whose mothers received average treatment.

(b) Therapeutic.—Ethel Dunham (*loc cit*) concludes that in suitable cases in which the Wassermann reaction of the mother's blood is positive, repetition of the Wassermann test on the newborn infant at frequent intervals will aid in differentiating between reactions that indicate a true syphilitic infection, and those that are positive because of the passage of antibodies from the mother to the infant. Correct evaluation of the results of repeated tests will prevent the unnecessary treatment of nonsymphilitic infants.

ACETARSONE, which, according to C. H. Maxwell and J. Glaser (Am J Dis Child 43 1461 (June) 1932) is known in France as *stovarsol*, in Germany as *spirocid* and in Russia as *osarol*, has been accepted in "New and Nonofficial Remedies" by the Council on Pharmacy and Chemistry of the American Medical Association as *acetarsonic*.

Acetarsonic, according to the authors, is a pentavalent arsenic compound. It is a white, odorless powder, having a slightly acid taste, is slightly soluble in solution of alkalis or alkaline carbonates. It is stable at ordinary temperatures. Acetarsonic contains from 27.1 to 27.4 per cent arsenic, whereas neoarsphenamine contains 20 per cent and arsphenamine 32 per cent. The French, German, Russian and American chemists manufacture the drug in 0.25 Gm (4 grain) tablets.

Maxwell and Glaser treated 12 infants and 9 children with acetarsonic. The 12 infants were either syphilitic or the offspring of syphilitic mothers. One infant developed flaccid paralysis from

which gradual recovery is now being made. A second infant developed flaccid paralysis and death occurred, apparently as a result of acetarsone therapy. Both infants had positive serologic reactions at the beginning with a reversal during the course of the treatment.

The remaining infants completed full courses of treatment. Four Wassermann reactions that were negative at the beginning of treatment remained negative, while 6 Wassermann reactions that were positive at the start, were reversed. Two of the infants received mercury in small amounts preceding acetarsone therapy. Definite physical signs of syphilis were present in only 2 cases. The nutrition remained or became satisfactory in every case.

The treatment of the children over 1 year of age had not been continued long enough to permit any conclusions. However, it seemed definite that, in common with other methods of treatment, the Wassermann reaction is not so easily influenced as in infants under 1 year of age.

H. A. Rosenbaum (Am J Dis Child 44:25 (July) 1932) treated 41 cases of congenital syphilis with stovarsol. In 9, the treatment was begun during the first year and continued for a year or more, serologic reversal was obtained in all cases, and clinical results were excellent. Of the 6 patients who were more than 1 year of age when treatment was begun and in whom it was continued for a year or more, serologic tests became negative in only 3, although clinical results in all of them were excellent. The remaining cases were not reported as a group, since the patients were not under treatment for a period of a year. Clinical improvement occurred in all patients. Serologic tests were reversed or influenced in most cases.

Acetarsone was used by A. F. Abt and A. S. Traisman (J Ped 1:172 (Aug) 1932) in the treatment of 22 cases of congenital syphilis. The clinical symptoms improved rapidly, the cutaneous lesions cleared in 1 to 3 weeks. The bone lesions healed rapidly after 1 course of treatment, both clinically and by x-ray. The improvement in the general condition of the children was impressive. The appetite increased and the gain in weight averaged about $4\frac{1}{4}$ pounds for the 9 weeks' course of treatment.

The Wassermann reaction after 1 course of treatment became negative in 59 per cent of the cases. Most of the negative Wassermann reactions were obtained in infants under 1 year. The results of the peroral administration of stovarsol according to the authors, warrant the belief that it is the method of choice in the treatment of congenital syphilis.

Dosage—H. B. Mettel (Arch Pediat 48:761 (Dec) 1931) states that in his study no standard dosage was made, but, as a general rule, stovarsol was administered as 1 tablet (0.25 Gm—4 grains) of the medication per kilogram ($2\frac{1}{8}$ lbs) of body weight, this dosage constituted a course. In the early cases 1 tablet was given every other day during the first week to determine the patient's tolerance, later, the dosage of 1 tablet every day for 3 days, followed by a period of 2 days' rest, was adopted. This was the intermittent method. A later group was treated by the continuous method. A daily dose was tolerated with no ill effects, provided the patients were kept under constant observation. The daily dose was dissolved in water and given $\frac{1}{2}$ hour before breakfast. After a course of 4 to 5 weeks, a rest period of 2 to 5 weeks was given.

Reactions to Stovarsol—According to Abt and Traisman (*loc cit*), there have been comparatively few untoward reactions experienced with the oral administration of stovarsol. Maxwell and Glaser (*loc cit*) state that while the toxic effects noted with the use of the medication have been more frequent than those accompanying the use of arsphenamine, they have at the same time been less serious. The toxic effects noted, according to Maxwell and Glaser, have been aching, chill, fever, abdominal pain, jaundice, adenitis, urticaria, edema, albuminuria, eosinophilia, leukopenia and pruritic anal eczema. It seems that the toxic effects reported have been less frequent in the infant than in children and adults.

None of the patients reported by Mettel (*loc cit*) and by Rosenbaum (*loc cit*) developed untoward symptoms. Two infants treated with stovarsol by Maxwell and Glaser developed flaccid paralysis; 1 of these infants died, apparently as a result of stovarsol treatment. Untoward reactions occurred in 4 of the patients treated by Abt and Traisman. Two infants developed slight diarrhea, 1 developed an exanthem and was found to have albumin and an occasional red blood cell in the urine, following this diarrhea, abdominal pains and fever occurred. The patient then was given repeated intravenous injections of sodium thiosulphate. Death, however, finally intervened.

Abt and Traisman and other authors strongly emphasize that patients undergoing treatment with stovarsol should be kept under close and careful observation. Parents should be warned that at the first sign of fever, vomiting, diarrhea, or appearance of rash, the medication should be immediately discontinued.

BISMARSEN—S O Chambers and G F Koetter (*Arch Derm and Syphil* 25 1065 (June) 1932) consider that the use of bismarsen in congenital syphilis simplifies the treatment. The dosage was 0.02 Gm ($\frac{1}{8}$ grain) per kilogram ($2\frac{1}{2}$ lbs) daily. The total duration of a course of treatment was 9 weeks, followed by a rest period of 6 weeks.

SULPHARSPHENAMINE—According to the report of the Council on Pharmacy and Chemistry of the American Medical Association (*J A M A* 99 1688, 1932) there seems to be in terms of percentage, a higher incidence of reactions following the use of sulpharsphenamine than after the use of other arsenicals. All patients under treatment with sulpharsphenamine should be followed closely by the physician for evidence of reaction. The drug, according to the Council, probably has a place in the treatment of syphilis, since it occasionally can be used by the intramuscular route in the treatment of herido-syphilis and in certain cases in which it is difficult to administer medication intravenously.

For intramuscular or subcutaneous use, the drug should be dissolved in sterile, freshly distilled water in the proportion of about 0.1 Gm ($1\frac{1}{2}$ grains) to 3 cc (48 minims), for intravenous use the maximum dose should probably not exceed 0.4 Gm (6 grains) at least 0.5 Gm ($7\frac{1}{2}$ grains).

Complications of Arsenical Treatment.—T H Butler (*Brit. J Ophth* 16 356, 1932) reported a case of *optic atrophy* in one of twin children with congenital syphilis. It was felt that the reaction was a result of the treatment. He concludes that it would be wrong to infer from a few, isolated examples that trivalent arsenic preparations are liable to cause optic atrophy.

T

TESTES AND EPIDIDYMIS.—TUMORS.—There is no more tragic chapter in medicine than that concerning the treatment of tumors of the testes. By the time most of these tumors are discovered and diagnosed, metastases have already taken place and in the vast majority of cases, the surgical treatment has been followed by failure.

C. A. Coleman, J. A. Mackie and W. M. Simpson (*Surg Gynec Obst* 55:111 (July) 1932) found 50 cases of neoplasm of the testicle out of 300,000 admitted to The Mayo Clinic. A primary malignancy of the epididymis is reported by these writers with the diagnosis of teratoma. The neoplasm was of the undifferentiated embryonal carcinomatous type. Most pathologists are in agreement with Ewing, who states that all of the common neoplasms of the testes are of teratomatous nature, in which one type of tissue predominates. These embryonal carcinomata are the most malignant. The writers admit the failure of surgery.

Treatment.—Malignant neoplasms of the testicle are also reported by I. Simons (*Am J Surg* 15:261 (Feb) 1932), by McClure, Sanguinetti and Carlton (*Brit J Urol* 4:217 (Sept) 1932), and McCrocklin (*Internat J Med Surg* 45:224 (May) 1932). These men all attempt to classify testicular neoplasms and report cases. All writers admit the failure of surgery. Even with radiotherapy, with or without surgery, the results are not satisfactory.

Simons states that with simple castration, less than 5 per cent are cured for a period of 6 years and believes that pre- and postoperative radiation should be combined with surgery.

McClure outlines the principles of radical surgery in which all the retroperitoneal tissues are exposed, the testicle, spermatic vessels and vas deferens and all of the glands around the iliac vessels to the renal vessels above and from well outside the outer border of psoas are removed. During the course of the incision, metastases may be seen with the naked eye. If so, it is felt futile to excise them, since there must be others beyond the reach of the knife. The operation is therefore terminated.

Pierson (*J Urol* 28:353 (Sept) 1932) reports a case of bilateral malignancy of the testicle which was mistaken for bilateral tuberculous epididymitis. The pathological diagnosis was bilateral embryonal carcinoma. Both tumors were removed by castration and x-ray treatment was given. The patient has lived for 3 years and 2 months after operation without developing metastases. This castration was remarkable in that it produced no loss of libido or potency.

THIOCYANATES.—PHYSIOLOGICAL ACTION.—Thirty-five well controlled patients, most of whom showed the effects of continued arterial hypertension, were treated with potassium thiocyanate by R. S. Palmer (*Am J Med Sc* 184:473 (Oct) 1932). The dosage of thiocyanate was varied considerably, according to the ability of the patient to take the drug, but in general 2 concentrations were employed, *i.e.*, $1\frac{1}{2}$ grains (0.1 Gm) per dram (4 cc) and 5 grains (0.3 Gm) per dram (4 cc) of peppermint water. These doses were given from 1 to 3 times daily for 4 to 8 or 10 weeks. The

weaker concentration only was used in 15 cases, while both the weaker and stronger concentrations were used in 20, which included the 7 patients showing undoubted hypotensive effect and the 4 patients showing the probable effect. Only 4 patients in whom the stronger concentration was used failed to show at least a possible hypotensive effect. Thus, when used in sufficient dosage, a definite and marked lowering of the arterial blood-pressure was produced in 31 per cent of the cases. *Toxic effects*, which were observed in 9 patients in the series, consisted of skin rashes, gastrointestinal symptoms and central nervous system symptoms, such as acute apprehension and excitement, severe enough in 1 case to constitute a toxic psychosis. Toxic effects, however, were reduced to the minimum by carefully controlled dosage. According to the author, although weakness may accompany the use of the drug, it is probably not a toxic effect and does not necessarily contraindicate its use. In subjects suffering from angina pectoris, this symptom may be increased and in some cases it may be induced by the use of the drug.

In conclusion, the author states that limited observation of the use of the drug in combination with a general régime, including rest and diet, suggests that it may be of value, though these results may not be referred to in accurately appraising the hypotensive action. Generally speaking, it may be said that the hypotensive effect is not lasting and that a second or third such effect after the drug is once discontinued, is more difficult to obtain.

UNTOWARD EFFECTS — The toxic effects of thiocyanate in man are known and have been repeatedly observed by independent investigators, particularly within the past few years since

this drug has been used therapeutically in cases of hypertension. W. Goldring and H. Chasis (*Arch Int Med* 49:321 (Feb) 1932), in reporting their results in a series of 50 cases with hypertension, present data to emphasize the fact that in some patients there is little or no margin of safety between the toxic and therapeutically effective dose. Of the 50 patients with hypertension who were treated 74 different times with sodium or potassium thiocyanate, 13 patients, or 17 per cent, presented toxic manifestations. In 11 of these the toxic manifestations disappeared within a few hours to 4 days after discontinuance of the drug. The usual order in which the toxic symptoms made their appearance was as follows: muscular fatigue accompanied or followed by nausea; vomiting, disorientation and mental confusion, motor aphasia, hallucinations of sight and hearing, and, in 2 fatal cases, progression to delirium, convulsive twitchings, coma and death.

The fall in blood-pressure, the occurrence of toxic symptoms and death were found by the authors to be unrelated to the amount of thiocyanate administered or to the amount of residual drug in the body. In the 13 patients exhibiting untoward effects, the average daily dose ranged from 0.17 to 1.62 Gm ($2\frac{2}{3}$ to 25 grains). The total dosage at the time of thiocyanate intoxication varied from 5.87 to 32.54 Gm ($1\frac{1}{2}$ drams to $1\frac{2}{3}$ ounces). The smallest total dose given was 0.652 Gm (10 grains) daily for 9 days, and the largest 0.638 Gm ($9\frac{4}{5}$ grains) daily for 51 days. In the opinion of these investigators, there can be little doubt, from the observations presented, that toxic effects and even a fatal outcome may occur in some patients who have in their tissues a smaller amount of thio-

cyanate than others who not only do not become toxic, but experience a satisfactory fall in blood-pressure. Thus, from the data presented, the authors are led to believe that some individuals, for reasons which are not clear, show a distinct susceptibility to thiocyanate and that in certain of these individuals there is little or no margin of safety between the toxic and therapeutically effective dosage of thiocyanate. From a practical standpoint it is unfortunate that no way is known of distinguishing those persons who will exhibit susceptibility from those in whom the drug lowers blood-pressure effectively without the development of toxic symptoms.

In a discussion of the toxic manifestations of potassium sodium thiocyanate, J. C. Healy (New England J. Med. 205:581 (Sept. 17) 1931) states that the thiocyanates in doses large enough to appreciably reduce blood-pressure are toxic and may prove fatal. The syndrome of hypoadrenia has been produced clinically and experimentally with what have been described as therapeutic doses of thiocyanate, and under certain conditions the drug is cumulative in its action, according to this investigator. Other symptoms of intoxication, such as gastrointestinal weakness, rash, dermatitis, and psychoses, may, in fact, be manifestations of hypoadrenia of greater or less degree, in his opinion. The incidence of intoxication definitely increases with the age of the patient.

TONSILS.—BACTERIOLOGY AND EPIDEMIOLOGY—Adding to his previous work of studying epidemics of septic sore throats of milk origin, Davis (J. Bact. 23:87 (Jan.) 1932) finds a number of well-established facts:

1 The epidemics are sudden, sharp

and severe, indicating a massive dosage of the infecting agent.

2 The sick are largely limited to users of one milk supply. There are relatively few contact infections.

3 Epidemics rapidly recede when the infected milk supply is cut off or the milk pasteurized.

4 Usually one cow is found with udder infected with an encapsulated hemolytic streptococcus. This organism produces large mucoid, watery, spreading colonies, growing especially well on ascites blood agar. These organisms were observed in the Chicago epidemic of 1910 and 1911 and have become known since then as the *Str. epidemicus*.

5 Experiments indicate that when these streptococci are implanted in the cow's teat, they will rapidly ascend the duct and localize in the udder, causing mastitis. They may continue there for long periods, thus giving rise to the carrier state. The udder may or may not reveal gross physical changes.

6 Similar encapsulated streptococci are uncommon in the throats of normal persons (less than 1 per cent), but more common in infected throats (12 per cent of tonsils). Sporadic cases of septic sore throat indistinguishable from epidemic cases are occasionally seen. From such throats encapsulated streptococci of the epidemicus type may be found.

7 These encapsulated streptococci produce toxins which give rise in animals to specific neutralizing antiserum. The toxins cause specific skin reactions in susceptible persons (differing from scarlet fever toxin). A study of several strains indicates that they are heterogeneous by the agglutination test. Agglutination tests, however, are often unreliable for encapsulated organisms. We have not as yet compared the toxin

antitoxin properties of a number of different strains

8 From a study of many epidemics of septic sore throat, it appears that not infrequently cases of scarlet fever and erysipelas occur as complications. There is marked variation in this respect. At times, scarlet fever and skin rashes are relatively common. Again, they may be rare or absent, and erysipelas is relatively common. On the other hand, it is well known that sore throat without rash is common during epidemics of scarlet fever.

9 Strains of streptococci classed as scarlet fever or erysipelas organisms, on the basis of skin and other tests, at times develop capsules and grow quite like strains of *Str. epidemicus*. Such strains may be the cause of milk-borne scarlet fever. The variability in these clinical manifestations together with the variability in properties of streptococci from epidemics of septic sore throat, scarlet fever and erysipelas suggest the possibility of a variable toxigenic and serologic property.

10 A study of the world distribution of epidemics of septic sore throat of milk origin reveals 3 general localities, *viz* (a) Great Britain, (b) Scandinavia and Denmark, and (c) United States and Canada. In other parts of the world the methods of treating milk supplies may explain their freedom from infections.

J. D. Hindley-Smith (Brit J Phys Med 6 145 (Oct) 1931) calls attention to the fact that clinical research suggests the existence of an acute disease having invariable characteristics, for which the name "*acute streptococcal fever*" has been proposed. Other workers who have been studying the condition of chronic rheumatism have suggested that this is also due to the

streptococcus acting under conditions of cell sensitization in the affected organism. A careful analysis of a large number of cases has led the author to the conviction that chronic rheumatism may be due to other causes than the streptococcus but that the streptococcus does, in fact, produce a disease having a definite syndrome and which is recognizable in its various stages, and of which the later symptoms include chronic rheumatism. Support for the theory that there is a condition of allergic sensitization at work in these cases, in addition to the streptococcal infection, is to be found in the fact that treatment with specific autogenous vaccines produces a high percentage of success.

The presence of *Brucella abortus* was noted by C. M. Carpenter and R. A. Boak in 8 out of 56 pairs of tonsils (J. A. M. A. 99 296 (July 23) 1932). In studying the effect of feeding milk artificially and naturally infected with this organism to calves, Carpenter observed that the lymph nodes draining the mouth and pharynx became infected first and remained infected the longest of any of the tissues examined. This observation on calves suggested a further study of diseased tonsils from man. Undulant fever is now a well established disease of man, but much information is wanting concerning its diagnosis, modes of infection, pathology and treatment. There are those who like to believe that *Brucella abortus* gains entrance to the body only through wounds, while others prefer to accept the digestive tract as the common channel through which the invasion occurs. Undoubtedly, both routes are vulnerable. Soon after *Brucella abortus* was discovered in raw cow's milk, Mohler and Traum became interested in determining whether the organism was pathogenic

for man They infected guinea-pigs with extracts from 56 tonsils and adenoid tissue removed from children who had drunk raw milk They reported finding typical lesions of the disease in 1 guinea-pig from whose liver, spleen and testes *Brucella abortus* was isolated The authors do not wish to convey the impression that *Brucella abortus* is a cause of tonsillitis or of hypertrophied tonsils Nevertheless, in experimental and domesticated animals the infection localizes in lymph and lymphoid tissue, frequently producing a focal or general lymphadenitis, as well as a splenitis At the onset of many cases of undulant fever there is a reddening and injection of the fauces, pharynx, tonsils and peritonsillar tissue, not unlike that seen in an acute infection of the upper respiratory tract Cervical adenitis is not uncommon That these pathologic changes are specific of *Brucella abortus* infection is not known The organism may invade the tonsils and multiply or accumulate there until the resistance of the host is decreased from fatigue or from disease, permitting its invasion of the blood stream

FOCAL INFECTION.—O R Lourie (Arch Ophthal 8 24 (July) 1932) believes that the beneficial results claimed by the supporters of the theory of focal infection are insignificant in comparison with the sacrifices involved due to operations The mass removal of tonsils is the result of insufficient knowledge of the causes of rheumatic and other infections Insufficient knowledge, as a rule, should not be taken as an indication for an operation The practice of medicine is not experimentation in a laboratory The theory of elective affinity does not solve the problem of focal infection and is little help in the treatment for ocular diseases.

H B Lemere (Am J Dis Child 4·1494 (June) 1932) calls attention to the fact that the *adenoid* is a physiologic and lymphatic structure with a definite form and admirably designed to expose the greatest possible lymphatic surface as a barrier to the entrance of nasal infection through the nasopharyngeal mucosa into the general circulation He reports that in a series of more than 300 children the adenoids were left at the time the tonsils were removed Daily expulsive blowing exercises were insisted on as after-treatment Nasal breathing improved, colds and sinus symptoms and acute and chronic aural conditions were less frequent

VINCENT'S ANGINA.—*Symptoms.*—L S Dudgeon (J Laryng. and Otol 47 188 (Mar) 1932) states that in Vincent's angina the infection may be limited to the gums, which are red, swollen and tender, and which may exude pus at the gingival margin and lead to the formation of single or multiple ulcers varying in size In those cases with considerable tissue reaction a yellowish membrane is formed on the surface of the ulcers, and, if it is detached, bleeding freely occurs In these cases, gangrene seldom supervenes Similar ulcers may occur on the tongue, throat or pharynx and present a similar appearance The ulcers, when situated on the tongue, may be exquisitely tender, and the patients often feel extremely ill The severity of the illness usually depends on the extent of the infection and the pain associated with the ulceration The breath is offensive but varies in different cases, according to the intensity of the necrosis or gangrene Some of the worst cases observed by the author followed extraction of teeth, especially when there has been much laceration of the gums There may be evidence of

infection around the remaining teeth. In other instances, the gums are pallid at the onset and show little or no evidence of tissue reaction, and it is in such cases that gangrene is likely to occur. The tonsils, especially, are likely to be affected and the infection may extend to the mouth and pharynx. Here, again, as already described in the mouth infections, shallow ulcers may be seen, with a bright red reaction in the walls and covered by a yellow membrane. In the severest cases of Vincent's angina, the ulceration is situated on one or both tonsils and may spread rapidly in various directions, such ulcers are deeply excavated, do not bleed readily, are covered by a purplish-brownish slough, which is friable, and have a very offensive odor. The margins of these ulcers are pallid, and apparently there is but little reaction. The ulceration may extend deeply into the tissues and severe hemorrhage may occur, especially when there is a slight reaction to the infection and rapid extension of the gangrenous process. In these cases of Vincent's angina will be observed the severest of all the infective processes which occur in the mouth and throat. As in many other acute infections, the degree of pyrexia is not an indication of the severity of the illness, it may be at a high level for a few days in a simple acute case, or there may be little or no pyrexia. Enlargements of the submaxillary and cervical lymph nodes may be slight or considerable, depending on the severity of the infection, but it seldom reaches the degree encountered in severe diphtheria. The rapidity of the pulse and the degree of toxemia are the surest indications of the severity of the illness. Investigations should be made to exclude any concurrent illness in cases of Vincent's angina.

Diagnosis — Mangabeira Albernaz recently read a paper before the Sociedade de Medicina e Cirurgia of the city of Campinas, São Paulo, on the coexistence of *Vincent's angina and diphtheritic angina*, which is rare (J A M A 99 1008 (Sept 17) 1932). The author warns against confusing the association of these 2 forms of angina with those cases in which 1 form only is present, but in which the etiologic agents of both forms exist. The speaker believes that the clinical diagnosis is more important than the microscopic diagnosis. The microscopic diagnosis is of great value as a confirmation of the results of the clinical diagnosis. If the angina improves under the effect of the serum or of local bismuth treatment, this proves that there is not a true association of the two forms of angina, even though the examination has shown the presence of the etiologic agents of both forms. That is the reason why the benign ambulatory forms of both diphtheria and fusospirochetosis are spontaneously cured. The only thing that proves the simultaneous existence of the two diseases is the presence of the different types of false membranes. The characteristics of these two membranes are the membranes in diphtheria are continuous, pale yellow, adherent and with loose lateral edges. The membrane in fusospirochetosis is dark, fragile, and exists only for a short period of the disease. In cases in which the coexistence of the disease is well proved, the treatment must be mixed serum in large amounts and local bismuth treatment. The treatment gives good results because in cases in which the two diseases coexist there is a reciprocal action of the virulence of the two etiologic agents. The author reports 3 cases in which both were present and in which the diagnosis

was made by clinical examination and confirmed by laboratory tests

Ulceronecrotic Form of Buccal Fusospirillosis.—J Gaté and P J Michel (Paris méd 1 51 (Jan 16) 1932) assert that Vincent's fusospirillary symbiosis may produce isolated ulcers, and necrotic and atypical lesions in different parts of the mouth. Their 2 personal observations include 1 patient with a true ulceronecrotic sphacelous glossitis of the tip of the tongue, and a second patient with the fusospirillary infection localized on the internal surface of the cheek. Local treatments (frequent gargling with boiled water to which some hydrogen dioxide was added, painting twice daily and alternately with a 10 per cent solution of silver nitrate and a 1 per cent solution of methylthionine chloride, local dressings with neoarsphenamine, and excision of the pseudomembranous formations) led to recovery. *Prophylaxis* should include treatment of the primary foci (gingivitis and pyorrhea) as well as repair of the teeth. The anatomopathologic study of their personal observations added to other observations from the literature lead the authors to emphasize the importance of spirillary infections in papillomatous processes.

In a review of the present status of *Plaut-Vincent's infection*, V Harrell (Arch Otolaryng 14 1 (July) 1931) concluded

1 Plaut-Vincent's infection is a localized fusospirochetosis

2 Accepted opinion supports the theory that the fusiform bacillus and the spirochete are different forms in the life cycle of the same organism

3 Judged by the extent of necrosis and distribution throughout the body, Vincent's infection is more severe in the

tropics than in temperate or arctic climates

4 Well-supported evidence that Vincent's infection is communicable makes advisable the recommendation that it be universally reported under epidemic conditions. Control measures should include isolation

5 The possible relationship of agranulocytosis and Vincent's angina requires further investigation

6 The use of bismuth preparations constitutes the best form of treatment, for they are less toxic, more powerful and more economical

Treatment of Vincent's Angina—It is pointed out by C Firestone (Northwest Med 31 335 (July) 1932) that the practical abandonment of the idea that the spirillum is the causative organism of Vincent's angina renders the use of arsenic and its preparations irrational in the combating of this disease. In the hands of the author, this drug has proved of no more than empirical value. The offending organism, which is generally believed to be an anerobe, finds the tonsillar crypts an excellent habitat, and it is there that it becomes insidious. **Tonsillectomy** performed in the routine manner aborts this disease when it is located in the tonsils or tonsillar regions. Recovery from the tonsillectomy is uneventful

MALIGNANT PHARYNGEAL DIPHTHERIA.—**Treatment.**—A Lichtenstein's (Ztschr f Kinderh 51 755, 1931) evaluation of the efficacy of large and of small doses of diphtheria serum is based on 1860 cases of uncomplicated, malignant, pharyngeal diphtheria, in which the patients received treatment in a Stockholm hospital during the 30-year period from 1900 to 1929. His object is not to discuss the serotherapy of diphtheria in general, but

only to determine whether the large doses which have been given in recent years have reduced the lethality in comparison with the smaller doses of earlier years. He found that the increase of the immunity units from 5000 to 10,000 in the earlier years, up to from 100,000 to 200,000 in recent years, has not effected any decrease in the mortality rate, either when the entire material is considered or when it is divided into groups according to severity, time of administration and age of the patient. The incidence of *paresis* of the mild as well as of the severe forms, and perhaps also the frequency of myocarditis, have increased in spite of the larger doses. The incidence of late toxic albuminuria, however, has somewhat decreased.

POSTANGINAL SEPSIS.—I. A. Abt (J. Pediat. 1:8 (July) 1932) states that postanginal sepsis usually follows a tonsillar infection or may be preceded by a pharyngeal phlegmon, an intra-tonsillar abscess. There are a few cases in which the sepsis occurred during an attack of scarlet fever or after a tonsillectomy in which severe infections followed. As a rule, the focus from which sepsis develops is the retrotonsillar phlegmon. Whether a bacteremia or pyemia develops depends on various factors difficult to determine. The majority of cases heretofore reported have occurred in young healthy persons. The greatest incidence is between 20 and 30 years. Localization on the left side seems to be more frequent than on the right. The pyemia may develop shortly after the primary focal infection or the symptoms of sepsis may be deferred as long as 4 weeks after the primary disease, though an analysis of all the cases shows that the average length of time that elapses is from 10 to 14 days after the original infection. This con-

stitutes a latent period, during which the patient seems comparatively well. The occurrence of chills is of great importance, especially if they are observed after the angina has subsided. The occurrence of a chill indicates that organisms are gaining access to the circulation and that the inflammatory process is no longer localized or walled-off. Remittent fever may be associated with chills. In the severest forms of the disease, a continuous high fever may be present without chills, extensive metastasis may occur, and death results after a short period. The patients present the general symptoms usual to a septic infection, such as pallor, subicteric hue, dry tongue, rapid pulse and rapid respiration, malaise, prostration and somnolence. The most serious and most frequent *complication* is the formation of metastatic foci in the lungs. Periarthritic abscesses or septic arthritis are not infrequent. Abscesses in muscles and liver, suppurative kidney processes, and cavernous sinus infection, with the production of ocular symptoms, and purulent meningitis have been observed. Paralysis of the hypoglossal nerve and the recurrent laryngeal nerve may result from abscess formation in the parapharyngeal space. The prognosis in postanginal sepsis is grave.

G. Jung and H. Wendt (Deutsche med. Wchnschr. 58:169 (Jan. 29) 1932) describe a case of *posttonsillitic thrombophlebitic sepsis* that was caused by hemolytic staphylococci. They consider this case noteworthy because timely ligation of the jugular vein, wide opening of the connective tissue spaces of the throat and later enucleation of the abscessed right tonsil effected cure.

The subject of *posttonsillitic pyemia*, as to pathogenesis, diagnosis and ther-

apy is discussed by N Taptas (Presse méd 40 414 (Mar 16) 1932) He thinks that in this disorder the infection spreads along the lymph channels to the lymph nodes in the region of the jugular vein and from there by continuity to the latter Frequently, the venous walls become infected before disintegration of the lymph node and formation of a cervical phlegmon In other cases, formation of a peritonsillar abscess and a deep phlegmon of the neck appears first and it is not until much later, if the drainage of these pus collections is unduly delayed, that the cervical veins may be attacked Histologic examination of the tonsils which are the starting point of the pyemia reveals perivascular infiltrations, and the peritonsillar venules, even in cases in which the tonsils appear clinically healed, are often thrombosed At the onset of pyemia all tonsillar inflammation may have disappeared, also pus in the tonsillar, peritonsillar or retrotonsillar region may be absent, but inflammation of the lymph nodes around the jugular vein always exists, if it is known how to locate it

Treatment.—While it is impossible to tell in the beginning of a case of acute tonsillitis whether it will terminate in pyemia, the hope of recovery depends on early intervention, Taptas (*Ibid*), therefore, advises being constantly on the watch for it and suggests several methods of procedure for the physician, depending on the condition of the patient at the time he is first seen If the tonsillitis persists after a week or if remission of symptoms is followed by recurrence, and formation of a peritonsillar abscess impends, it is better to perform **enucleation of the tonsil** immediately to prevent formation of the abscess, hasten the cure of the infection and prevent its spread to distant parts

of the body If on the first visit to the patient the tonsillitis is cured but the temperature remains elevated, with remissions of septic fever, or there is continuous fever without chills and the cervical region at the angle of the maxilla is more or less sensitive or infiltrated, an incision should be made at the anterior edge of the sternocleidomastoid to inspect the jugular vein If the vein is diseased or a deep phlegmon is found and drained, the tonsil which served as the portal of entry should be removed before the end of the operation If the vein is healthy, exposure for examination by a small aseptic incision is not harmful Waiting till symptoms of pyemia appear endangers the life of the patient In cases in which the patient is first seen several days after the onset of tonsillitis and a peritonsillar abscess has already formed, if the jugular region is free and the abscess well-formed, an **incision** of the soft palate can be made and the abscess **drained**; but if this appears difficult, it is better to enucleate the tonsil In this way, by removing the inner wall of the abscess, the cavity is transformed into an open wound, permitting the best possible drainage

If the first examination reveals tonsillar or peritonsillar inflammation accompanied by an engorgement of the jugular region with high fever, **tonsillec-tomy** must be supplemented by exposure and inspection of the sheath of the large vessels In such cases, sometimes a deep collection of pus is found, with extensive detachment of the pharyngeal wall, **drainage** of which is followed by cure

At other times, the veins of the neck are involved without the formation of an abscess and it is necessary to dissect and resect them Here, it should be re-

membered that in deep collections of pus as much as in thrombosis of the jugular vein, the skin and subcutaneous tissue remain entirely healthy, the lesions being located below the deep cervical fascia. It is difficult, even in case of an advanced lesion, to feel a definite hardness at this depth, trying to feel a hard cord to diagnose thrombophlebitis exposes the patient to irreparable lesions.

The treatment is for the most part **surgical**, according to Abt (*loc. cit.*). If the septic focus can be located, it should be drained. In general, it may be said that the earlier the purulent focus is detected and the contents evacuated, the more favorable the prognosis. Prompt surgical procedure, whether it be **evacuating an abscess** or **ligating the jugular vein**, will diminish the hazard of the disease and lower the mortality. Unfortunately, the area of infection usually lies deeply embedded and is difficult of access. In some instances, abscesses in or about the tonsils may be incised. The tonsillar veins are sometimes filled with infected thrombi, and Zange advises that all these small veins be ligated. The parapharyngeal space may be the site of infection, and drainage of this area may cause the greatest difficulty and requires unusual technical skill. When symptoms of general sepsis are present, as evidenced by chill and irregular fever, the jugular vein on the affected side should be ligated as early as possible, in order to prevent the formation of metastatic foci through the various tissues and organs of the body. All writers on the subject agree that **early ligation of the jugular vein** is the only logical treatment when the diagnosis of *septic thrombophlebitis* has been established.

G. Hofer (Monatschr f. Ohrenh. 66 587 (May) 1932) considers that

surgical intervention in *posttonsillitic septicemia* should be undertaken in the earliest stage of propagation of the infection. In all cases in which this propagation is attended by chills, the first real chill should be considered an indication for intervention. The clinical manifestations of posttonsillitic septicemia are variable. Severe chill followed by collapse is the chief general symptom, it is an unequivocal sign of the spread of infectious matter into the blood stream. Locally, a severe tonsillitis is usually followed by abscess formation which forms the basis for a septic condition. The large venous trunks in the neck may be sensitive to pressure, especially in cases of extensive thrombosis, but the pressure sensitivity may be lacking as the disease may take its malignant course without extensive thrombosis of the large blood-vessels, especially in the case of primary spread of infectious material into the blood stream. In cases with extensive suppuration of the cellular tissue of the neck, the pressure sensitivity is usually pronounced and early intervention is clearly indicated.

The author demonstrates by 2 case reports that good results can be achieved by **ligation of the jugular vein** and exclusion of the primary septic focus immediately after onset of the first clinical manifestation of tonsillogenic septicemia, even when no inflammation of the cervical tissue or the sheath of the vessel is demonstrable. In both cases the operation was undertaken within $\frac{1}{2}$ hour of a chill (the first), which had followed soon after draining of an abscess. Collapse of the internal jugular vein in both cases permits the conclusion that there may have been a mycotic venous thrombosis higher up. The author considers location of, and

intervention in, the mycotic thromboses not only difficult and dangerous but sometimes impossible. Exclusion of the primary focus, whether still active or not, and interruption of the chief downward route of propagation, the jugular vein, is the first therapeutic requisite, but to be effective, it must be undertaken in the first stage of the disease, after the first chill.

TONSILLITIS.—*Complications.*

—E Wessely (Ztschr f Hals-, Nasen- u Ohrenh 28 167 (May 26) 1931) first directs attention to the reports of other authors as well as to his own previous investigations and observations on the development of *endocranial complications* after tonsillar processes. He mentions particularly the tests on corpses which he conducted several years before. By making injections of india ink into the peritonsillar tissues of corpses shortly before death, he had noted the transmission of the india ink through the *spatium parapharyngeum* up to the foramen ovale. This route seemed to be best suited anatomically on account of the looseness of the connective tissue, and it also explained all symptoms on the part of the musculature and the nerves.

In order to make a detailed study of the route of infection in 1 case, he removed at autopsy a frontal block consisting of the left tonsillar region, the corresponding portions of the mandibula and of the base of the skull, prepared it for histologic examinations, and examined 280 sections. After describing the results of his studies, he states that the process was a phlegmon with perforation into the venous system. The inflammatory spreading took place in the anterior portion of the pharyngeal space upward, and attained its strongest development at the base of the skull.

Here the pterygoid muscles and the loose connective tissue of the *spatium parapharyngeum* contained abscesses and in portions they were destroyed. From the anterior edge of the internal pterygoid muscle the process was transmitted by suppuration along the branches of the trigeminus and also along the middle meningeal artery, through the foramen spinosum, into the middle cranial fossa. This is the route which seems predestined by the loose connective tissue and by the direct transmission along the nervous and arterial channels. This case is typical and many other cases are similar to it. However, another case described by the author represents apparently an entirely different type. In this case there existed a peritonsillar abscess which did not perforate into the mouth but eroded the pharyngeal wall. During a fever-free interval a second abscess formed, which spread in the direction of the least resistance, *viz*, cranialward. The inflammatory irritation of the nerves caused toothaches and later trigeminus neuralgia. On the other hand, in the plexus pterygoidens veins became thrombosed, eroded and infected, and gradually a retrograde thrombosis of the cavernous sinus developed with typical ocular symptoms. However, the fully developed pathologico-anatomic aspects in this instance were similar to those observed in the other case, only the course of the development was much slower and the temperatures were lower.

TONSILLAR INVOLVEMENT IN TUBERCULOSIS.—Careful macroscopic and microscopic examination of the tonsils, especially the pharyngeal tonsils, of 45 tuberculous cadavers, mostly of children, revealed to J Otto (Beitr z Klin d Tuberk 79 187 (Jan 20) 1932) that in about 74 per

cent of the cases the tonsils were involved in the form of a secondary infection. A primary infection of the tonsils and of the intestine was observed only once. Studies on all the organs and the microscopic examination of the bones of the base of the skull make it appear probable that during childhood the secondary tuberculous infection of the tonsils usually develops by way of the blood stream. Studies in 7 selected cases revealed no microscopic signs for the differentiation of a resorptive or of a hematogenic tonsillar tuberculosis. A differentiation is possible to some extent only in the beginning stages. A hematogenic origin is then indicated by the occurrence of numerous, similar tubercles in the subepithelial and in the perifollicular lymphatic tissue. An involvement of the follicles is only rarely observable. A resorptive tuberculosis can be assumed in cases of a pronounced involvement of the superficial subepithelial tissue layers. In somewhat advanced cases of resorptive as well as hematogenic tuberculosis, the lymphatic tissue shows the most changes. The cases studied by the author gave no indications for the development of a tuberculous leptomenigitis by lymphogenic spreading from the tonsils. However, in spite of the frequent secondary involvement of the tonsils in tuberculosis during childhood, this complication has only in rare cases a certain significance for the course of the tuberculosis, for the tuberculous lesions of the tonsils usually heal by cicatrization, and extensive destructive processes are a rarity. The careful study of the hematogenic and resorptive tonsillar tuberculosis shows that it is difficult to determine the pathogenesis on the basis of the histologic observations.

H J Schmid (Schweiz med

Wchnschr 62 497 (May 21) 1932) points out that it is generally known that tonsillitis may precede the first manifestation of a tuberculosis. However, that this is considered either as an incidental concurrence or that the tonsillitis is thought to be the factor that led to the manifestation of the tuberculosis, he does not accept as true for all cases. He admits that either may occasionally be true, but he thinks that in the majority of cases the relationship between the pharyngeal symptoms and the tuberculous process is closer. Against a mere accidental concurrence, speaks the considerable frequency of this combination. The theory that tonsillitis only causes the manifestation of the tuberculosis is contraindicated by the observation that not severe forms of tonsillitis precede the tuberculosis but usually comparatively mild forms, in which difficulty in swallowing is the main symptom, and there is a noticeable discrepancy between the slight local symptoms and the severe general symptoms, particularly the fever. In many instances, this stage of the disease is not seen by the physician, but the anamnesis often reveals that an "influenza with sore throat" preceded the tuberculosis. The author gives several case reports and in the conclusion he admits that the relationship between tonsillitis and tuberculosis also has a reverse aspect, that a chronic tonsillitis, by its increased temperatures, may simulate tuberculosis. But the author believes that because this is generally known to physicians, there may be danger that a tuberculosis is overlooked. He, therefore, emphasizes once more, that it should also be kept in mind that *a tonsillitis may mask a tuberculosis*.

According to M Vlasto (Brit J Tuberc 25 129 (July) 1931), second-

ary infection of the tonsils in adults suffering from advanced pulmonary tuberculosis is relatively common, probably owing to contact with bacillus-laden sputum. In children, the sputum is usually swallowed, and involvement of the tonsils rarely occurs. Primary tuberculosis of the tonsils is, in most cases, due to infection with the bovine bacillus, which enters the system by way of the alimentary tract. Except in rare instances, the clinical *diagnosis* of tuberculosis of the tonsil is impossible. The appearance of the organ is no guide whatsoever in the recognition of the condition. The presence of an enlarged gland in the area between the upper part of the sternocleidomastoid muscle and the lower jaw immediately over the posterior belly of the digastric muscle, while indistinguishable from infection by the usual pyogenic organisms, is perhaps the most suggestive sign of tuberculous infection involving the tonsil.

In commenting on occult tuberculosis of the tonsil in relation to tuberculosis, R. Webster (M. J. Australia 1:351 (Mar 12) 1932) presents the results of an investigation regarding the incidence of tuberculosis in the tonsils of 132 children. He made the significant observation that of 68 children exhibiting tuberculous cervical adenitis, 40 or 46.5 per cent, were shown to have tuberculous lesions in the tonsils. Among 46 pairs of tonsils removed for simple hypertrophy or other cause apart from tuberculous cervical lymph nodes, no instance of tuberculosis of the tonsil was detected. The value of histologic diagnosis is discussed. Emphasis is laid on the fact that primary tuberculosis of the tonsil is seldom, if ever, apparent clinically. On the basis of the results of his investigation, the author concludes that **tonsillectomy** is clearly indicated in

the treatment of tuberculous cervical adenitis.

TONSILLAR ABSCESSSES.—

Treatment—In their clinical experience D. Combiesco, I. Tzetzcu and M.-S. Popesco (Presse méd 40:1386 (Sept 10) 1932) have found that the treatment of tonsillar abscesses with **anti-staphylococcus bacteriophage** assures a rapid cure, usually within a few days. This treatment may be employed at any stage of evolution of the abscess, but is most indicated at the stage of infiltration. As the results obtained by the authors with the staphylococcus bacteriophage were uniformly good no matter what the bacterial flora of the pus, they think that these results cannot be due to a specific action of the lytic principle or from its exclusive action. Treatment of the abscesses with anti-staphylococcic or antistreptococcic filtrate prepared according to Besredka's method, as well as sterile peptone broth and physiologic solution of sodium chloride, gave the same results. They think that the mechanism of the therapeutic action of bacteriophage in the treatment of tonsillar abscesses may fall in the same category as the action of topicals employed in surgical therapy. The action of fluids inoculated into the abscesses may consist of a stimulation of the defense elements of the organism. The stimulant may be the bacteriophage, the substances contained in the bacterial filtrates, the broth, the physiologic solution of sodium chloride or other substances.

TONSILLECTOMY.—Local

Anesthesia.—In the administration of local anesthesia for tonsillectomy, J. W. Costello (Brit. M. J. 1:839 (May 7) 1932) gives **preliminary morphine** only to an unduly fearful minority; the patients' cooperation is gained by a short

explanation of what is to be expected of them. The fauces are liberally sprayed with 10 per cent solution of cocaine, after the patient has been cautioned against swallowing any of it. In 5 minutes the injection of 0.75 per cent procaine hydrochloride and epinephrine may be commenced. A light syringe and long needle are necessary. Injections are made into the upper and lower poles and just outside the margin of the anterior and posterior pillars, about the center. Enough should be injected to encircle the tonsil with a band of anemic tissue and saturate its bed, from which it will project rather more than usual if not too adherent or fibrosed. The faucial tissues should not be blown into edematous folds with the solution. By the time the second injection is finished, the first tonsil will be ready for dissection. This is done with the finger or dissector and scissors, but requires considerably more gentleness than is at times used in the dissection of tonsils under general anesthesia. In most cases, the work is done in a field that is nearly dry and may be proceeded with deliberately. The smallest adhesions should be snipped instead of torn. It is at this stage that the cooperation of the patient becomes particularly valuable, as by keeping his mouth well open and pharynx relaxed, he will give good exposure of the parts with the occasional help of a tongue depressor used only lightly. Any form of gag should be avoided, as being too uncomfortable for the conscious patient. At any stage, the partially dissected tonsil may be held with a swab while the patient is allowed to relax his jaw and rest, indeed, these spells may be encouraged if the tonsil is looked on as a piece of raw tissue and an efficient hemostat. After the removal of the

second tonsil is completed, swabs held in the tonsillar fossæ for a few minutes suffice to reduce the hemorrhage to a point at which the saliva is just colored, and the patient is able to walk to the ward or to be driven to his home.

Complications — **HEMORRHAGE** — J. A. Keen (J. Laryng and Otol 46 297 (May) 1931) reviews a continuous series of 9344 tonsil and adenoid operations in children, with the special object of studying the question of excessive and dangerous hemorrhage. The subject is discussed under various headings and the main observations and conclusions are as follows: (1) Primary hemorrhage depends to some extent on the method of operating. The average amount of blood lost after the guillotine operation was found to be just under 2 ounces (60 Gm). (2) The dissection and the guillotine operations are contrasted from the point of hemorrhage and from the point of view of operative "failures." The author strongly supports the guillotine method of enucleation and justifies this opinion by his end-results in the whole series. "Regrowth" of tonsillar tissue after complete enucleation does not occur in his experience. (3) Comparatively rare cases of excessive or reactionary hemorrhage occur in all large series of operations. In his hands the proportion of these cases was just over 1 per cent (110 cases among 9344 operations). An analysis is made of the amount of blood lost in these cases, and the best methods of dealing with this complication are described. (4) It is shown that a second anesthetic is extremely dangerous in hemorrhage cases. An account is given of 3 personally observed fatalities followed by a discussion on the possible causes of death. (5) Dangerous hemorrhage appears to come more often from the

nasopharynx than the tonsil areas (6) The literature on the *prophylactic use* of **calcium lactate** is reviewed The author's experience and figures of the amount of reactionary hemorrhage in the "bleeders," support the view that calcium lactate is useful in shortening the clotting time of the blood The view is expressed that hemorrhage after the removal of tonsils and adenoids is due to deficient clotting power of the blood and that anatomic and surgical considerations are of secondary importance.

Indications.—Indications for the removal of the tonsils and adenoids were discussed by George B Wood at a meeting of the Philadelphia College of Physicians (May 20, 1931) There is no doubt in Wood's mind but that the removal of the faucial and pharyngeal *tonsils* is frequently followed by most beneficial results, so much so, that it has come to be a most popular procedure, probably outranking, 20 to 1, all other operations on the nose, throat and ears Its popularity is not restricted to the medical profession, as modern parents do not consider their child's education complete until this mutilation has taken place It is possible that some day, according to the author, there will be placed on the statutes of the various state legislatures laws making this operation compulsory before a child can be admitted to a public school In fact, Wood has had pediatricians intimate that such a thing might not be a bad idea If the tonsil were a functionless organ, just a vestigial remnant, as the appendix, and if the operation were free from danger and not accompanied by pain and discomfort, the legislature might advisedly be looked to for aid in this time of financial depression

However, from their often expressed

opinions, it is evident that experienced laryngologists do not concur in the idea of the prophylactic operation and recognize the fact that the tonsillar structures of the throat may at times be perfectly normal in that they are not a present menace to the health of the individual, *i e*, that there are certain phenomena that should be considered as indications for operation, although it is probable that what constitutes an indication varies considerably in the minds of different operators In early childhood, the tonsillar tissues of the throat do have an important function as a member of a large group of hematopoietic organs, that the operation is not devoid of pain and discomfort, and that it is attended by enough fatalities to class it as an almost major operation, must also be admitted

Indications for the operation in children differ somewhat from those in adults, because in children removal of the faucial tonsils is often done as a sort of an appendix to the removal of the adenoids, whereas in the adult the pharyngeal tonsil is seldom disturbed In not a small percentage of children, the early removal of the faucial and pharyngeal tonsils is followed by hypertrophy of the other lymphoid tissues of the throat, and this hypertrophy may become a distinct menace to the patient It is exceedingly difficult to deal with this diffuse tissue In recent years, whenever the indications have not been urgent, it has been customary to limit the operation to children over 5 years of age It was surprising to find that indications that were thought present in children between the ages of 2 and 3 years, had disappeared 2 or 3 years later

If a positive history of *recurrent tonsillitis* has been obtained, the operation

is indicated without regard to the local appearances of the tonsillar structure. This also holds true in regard to peritonsillar inflammations. For clinical purposes, the cervical lymph nodes may be classed in 2 groups, the superficial and the deep, but it is the deep glands that are especially interesting in the study of infections of the throat. These are divided, anatomically, into the anterior and the posterior group by the anterior edge of the sternocleidomastoid muscle. The largest of these anterior glands is situated where the posterior belly of the digastric muscle crosses the anterior margin of the sternocleidomastoid muscle. This may be termed the *tonsillar lymph node*, because it receives the lymphatics from the faucial tonsils and the surrounding mucosa. The glands that lie under the muscle constitute the posterior group, and they receive drainage from the pharyngeal vault and the nasal fossæ. Therefore, in an infection originating in the pharyngeal tonsil, it would be expected that the group underlying the muscle would be enlarged, whereas the infection from the faucial tonsil would cause an enlargement of the so-called tonsillar lymph node. Chronic adenopathy of the tonsillar lymph node and the contiguous glands results from faucial tonsillar infection in probably 90 per cent of the cases. If the adenopathy is marked, if it shows recurrent exacerbations, a fairly strong indication for tonsillectomy exists.

Adenoidectomy, according to Wood, is indicated *between attacks of otitis media*, when the pharyngeal tonsil is enlarged or when it has been acutely inflamed at the time of the otitis. The faucial tonsils bear little etiologic importance to the infection through the Eustachian tube unless they are greatly

hypertrophied or are badly embedded high in the palate. Undoubtedly, a *pharyngeal tonsil that is large enough to produce mechanical obstruction* has a causative relation to nasal infection, including involvement of the sinuses. In children with frequent colds, careful examination of the pharyngeal tonsil should be made at the beginning of these colds as in certain cases the infection originates in the lymphoid tissue of the nasopharynx. The faucial tonsils do not have any etiologic bearing on nasal infections, and there is no justification for the performance of faucial tonsillectomy for nasal infections and their associated complications. When enlargement of the faucial and pharyngeal tonsils is great enough to provide mechanical obstruction, their removal is indicated. A faucial tonsil without other indications would need to be exceedingly large to warrant its removal, whereas a pharyngeal tonsil must frequently be removed just because of its size.

Aside from operations performed for relief from acute infection of the tonsil itself, it is possible that systemic disturbances resulting from the absorption of toxic materials from the tonsil are responsible for more tonsillectomies than any other series of indications. This is especially true in adults. It is exceptionally difficult to make a prognosis in these cases, and there is no method of examination that will determine with certainty the responsibility of the tonsil for any systemic infection. The number of diseases that are supposed to originate from a *focal infection* is so great that they could not possibly be covered individually at this time. Two or three of them seem to occupy considerable attention and perhaps merit discussion. Rheumatism and its allied conditions are today etiologically considered focal

infections In cases of acute rheumatic polyarthrititis and secondary chronic polyarthrititis, the tonsils, whatever their appearance, should be removed when the acute symptoms have subsided In cases of rheumatoid conditions and *chronic infectious rheumatism, neuralgia* and *myalgia*, the tonsils should be removed if they are diseased In cases of osteoarthritis, Bechterew's disease, gout and arthritis deformans, tonsillectomy seldom, if ever, is of any value

RADIUM TREATMENT OF TONSILLAR DISEASE.—While J C Scal (New York State J Med 32: 198 (Feb 15) 1932) recommends tonsillectomy in operable cases of diseased tonsils, over 8 years' experience has convinced him that the implantation of radon seeds constitutes a satisfactory substitute for use in inoperable cases Neither morbidity nor mortality attends the procedure, and the technic has been so developed that by the methods he describes, the operator is able to obtain complete atrophy of the tonsils without producing any inflammatory reaction or injury to the structures surrounding the tonsils There is no postoperative hemorrhage, no danger of lung abscess, no aspiration pneumonia, and no middle ear involvement The procedure is practically painless, it can be performed in the office, and the patient may be permitted to pursue his normal mode of life without inconvenience of any description Of the number of patients treated, 20 per cent were affected with joint symptoms, 28 per cent were cardiac patients, 3 per cent were subject to hemophilia, 5 per cent had exophthalmic goiter, 10 per cent were diabetic patients, 8 per cent had arteriosclerosis, and the remainder were treated for "fear of operation" There being no traumatism, the presence of subsequent

scarring and adhesions, so frequently seen after tonsillectomy, even when performed by a skillful operator, is done away with In persons subject to hemophilia, the bleeding following the needle puncture is sometimes annoying, but usually ceases after proper local treatment

ELECTROSURGERY—F B Balmer (Arch Otolaryng 15: 503 (Apr) 1932) considers that electrosurgery is a valuable and indispensable aid to classic surgery A thorough knowledge of the various electrical currents and their application is absolutely prerequisite for the proper and safe employment of electrosurgery The therapeutic action of the various currents is very selective, as well as being attended with an abundance of precision and flexibility In certain fields of surgery, electrosurgery has replaced the scalpel, and it bids fair to continue to do so Electrocoagulation does not replace surgery in the removal of the tonsils, however, it is better suited in certain selected cases. It is the method par excellence for the removal of postoperative tonsillar tissue and adhesions, lingual hypertrophy and varix, and for the extirpation of the tonsils in the presence of certain diseases There is at present no ideal method for the removal of the tonsils under all circumstances The combination of surgery and electrosurgery is a means of approaching this ideal The status of the orthodox surgical tonsillectomy is more secure since the advent of electrosurgery, owing to the fact that the postoperative difficulties that are so frequent can usually be remedied with this newer procedure with a minimum of inconvenience, morbidity and mortality to the patient Nothing short of total removal of the tonsils should be considered when they are dis-

eased and their removal is indicated, with the exception that diathermocryptectomy may be considered under special circumstances when a more conservative procedure is imperative. Electrocoagulation has many contraindications and limitations. The surgeon should be equipped to use the method best suited to the conditions at hand and should not be limited by lack of knowledge, ability or equipment, or by prejudice. The noticeable improvement following 2 or 3 treatments with electrocoagulation is probably due to the sterilizing effect of the current on the diseased tonsil tissue. The coagulated tissue remaining *in situ* probably acts similarly to an autogenous vaccine, causing a defense reaction to ensue.

TUBERCULOSIS, PULMONARY.—ETIOLOGY.—H. Opitz (Rev. méd. german-ibero-am. 5:16 (Jan.) 1932) considers that ordinary microscopic examination for tubercle bacilli in the sputum is inadequate even when the enriching methods are used. Cultivation of bacilli is more rational, preferably by injecting sputum or sediment obtained from stomach washings into guinea-pigs. This procedure has proved that practically all cases of perifocal inflammation considered as closed are in reality open tubercloses. The elimination of bacilli can be verified often for months and years, although clinical and x-ray examinations show disappearance of the pulmonary modifications. In tuberculous swellings of the bronchial lymph nodes and even in cases of insignificant and uncertain manifestations in the region of the hilus, represented roentgenographically by a somewhat pronounced shadow of this zone, positive results are obtained. This also applies to the extrapulmonary occurrence

of tuberculosis when the lungs are apparently intact. Tuberculous meningitis is always accompanied by elimination of bacilli in the sputum although no miliary tuberculosis is present.

Closed and benign pulmonary tuberculosis of older children is in reality in the majority of cases an open tuberculosis. In pulmonary processes of tuberculous nature in infants, proved clinically and by x-rays, tubercle bacilli can nearly always be demonstrated and inoculations in guinea-pigs with gastric sediment may show positive results even in cases of children with apparently intact lungs. These unsuspected eliminators of bacilli should be placed in a special part of the hospital and be separated from avowed tuberculous as well as from noninfected children.

W. J. V. Deacon (Am. J. Pub. Health 22:367 (Apr.) 1932) presents the results of a study of the *occupation of young females* dying from tuberculosis. During the years 1927 to 1930 there were in Michigan 2630 deaths of females between 15 and 29 due to tuberculosis (all forms). The death certificates of 289 did not contain a statement of occupation, or the statement was too ambiguous to determine whether or not the person was gainfully employed. These 289 were therefore eliminated and only the 2341 in which the statement of occupation was fairly clear were considered. The occupations given were: school, 14.1 per cent, and home, 62.3 per cent—not gainfully employed; industry, 23.6 per cent—gainfully employed. Of the 2341 deaths, 1787, or 76.4 per cent, were indicated as not gainfully employed; 554, or 23.6 per cent, were gainfully employed. From this showing it is obvious that industrialization is not an important factor in the mortality from tuberculosis.

among young women. The author sees no reason to believe that there is any more hazard involved when a young woman leaves her home, whether she goes to school or into an office, in most cases working not to exceed 8 hours under favorable sanitary environment. Whether housewives, employed persons or students are considered, the problem is in the home, and everyone who has experience in public work realizes that this is the most difficult group to reach.

H. Starcke (Beitr. z. Klin. d. Tuberk. 79: 691 (Apr.) 1932) is convinced that *hematogenic dissemination* is the main form in which tuberculosis spreads among children and young persons, for he observed it in 50.5 per cent of the cases. In over 40 per cent he noted apical foci. He does not believe that hematogenic early apical foci justify a more favorable prognosis than late apical foci. They are sometimes impossible to differentiate, and tuberculosis can spread from either of them to other parts of the lung, particularly when open caverns are present. Open caverns at the apex are not as rare as is commonly assumed. More significant than the differentiation between early and late hematogenic apical caverns is the differentiation between active and inactive disseminating foci. Early and late disseminations are prognostically equivalent, for even old, inactive apical foci may be the cause of further dissemination of pulmonary tuberculosis. Disseminations that are limited to the upper field have a doubtful prognosis, and pneumothorax treatment should therefore not be postponed. Phrenic exeresis does not prevent the formation of open cavities.

A. R. Rich and M. R. Lewis (Bull. Johns Hop. Hosp. 50: 115 (Feb.) 1932) studied living cells from animals rendered *allergic* to old tuberculin.

These cells were washed and contrasted with cells from normal animals in plasma from the allergic as well as the normal, treated with a preparation of old tuberculin. Marked damage was done to the allergic cells by the tuberculo-protein. It is clear from these studies that the living cells from the allergic tuberculous animal, even when washed, retain their hypersensitivity to tuberculin when separated from the body by means of tissue culture. From direct findings neither the circulatory, nervous nor other mechanisms dependent upon the intact body are necessary for the production of allergic damage. The antibody is attached intimately to the cell itself.

A. Calmette (Ztschr. f. Tuberk. 64: 38 (Mar.) 1932) shows that modern methods make it possible to observe the development of the *filtrable elements of the tuberculosis virus* to the fully developed tubercle bacillus, but there are certain gaps in this knowledge that have to be filled by further investigations. It is the task of the clinicians to differentiate between the disease-producing action of the ultravirus and that of the tubercle bacillus. Many infections in which a few acid-fast bacilli but no tubercles are found, *viz.*, such conditions as erythema nodosum, purpura rheumatica, and certain skin diseases that are accompanied by serous or articular effusions (pleurisy, pericarditis, meningitis and so on), are probably caused by the filtrable elements of the tuberculosis virus, and all these conditions might be grouped together as "prebacillary granulemas." The group of true bacillosis would then include only the generalized or localized diseases in which formation of tubercles takes place and which generally take a much slower course. The classic example of this category is chronic pulmonary tuberculosis.

The results of studies of human tuberculosis of *bovine origin* in the British Isles, have been recorded by A. S. Griffith (Edinburgh M J 39 177 (Mar) 1932). He has tried to establish the following facts

The bovine type of tubercle bacillus can produce ulcerative pulmonary tuberculosis in the human subject which is indistinguishable from that caused by the common tubercle bacillus causing tuberculosis in man

Pulmonary tuberculosis of bovine origin is more frequent in some parts of the country than in others. In Scotland and the northern countries of England, its incidence is approximately 40 per cent, whereas in the south of England it is slightly less than 10 per cent. Bovine tubercle bacilli appear in the sputum more frequently in communities where they have frequent opportunity to enter the human body (as shown by the high frequency of bovine infection in children) than in communities where such opportunity is more restricted

In the majority of the cases studied the tuberculous process in the lungs was secondary to an infection acquired in childhood through ingestion

While there is evidence from the distribution of the lesions that children may be infected with bovine bacilli by inhalation, there was no evidence in the cases studied that any of the phthisical adults had acquired the bovine bacilli from a previous case of phthisis or from tuberculous cattle directly by contact or through inhalation of infected dust in ship pens or byres

Bovine tubercle bacilli are conveyed to human beings through *milk* and its products and are restricted practically to one channel of entry, the alimentary tract. Their opportunities of invading

man are greatest when milk is the chief article of diet. Hence, bovine tubercle bacilli are found mainly in the tuberculosis of childhood and tuberculosis resulting from alimentary infection. The human tubercle bacillus, on the other hand, is more likely to be air-borne and thus to invade the human body chiefly by way of the respiratory tract. This type of bacillus is responsible for the great majority of cases of primary intrathoracic tuberculosis. Pasteurization of milk, eradication of tuberculosis in cattle, and elimination of infected cattle for breeding purposes are suggested as the logical prophylactic means of eliminating human tuberculosis of bovine origin

In discussing *tubercle bacilluria* as manifestation of generalized infection in pulmonary tuberculosis, H. Deist (Ztschr f Tuberk 64 256 (Apr) 1932) cites reports from the literature which indicate that the opinions are divided as to whether tubercle bacilluria may occur in extrarenal tuberculosis. Observations in animal experiments and on human subjects indicate that the kidney is permeable for tubercle bacilli when it itself is free from tuberculous infection. This observation tends to disprove the claim made by some that the presence of tubercle bacilli indicates renal tuberculosis. The importance of this factor for the combat of tuberculosis is emphasized but the greatest significance of tubercle bacilluria without tuberculosis of the renal tract is in the fact that it proves tubercle bacillemia, for the bacilli that are present in the urine can originate only in the blood. In some cases of tubercle bacilluria the Lowenstein method failed to demonstrate the presence of tubercle bacilli in the blood, but this is ascribed to the fact that the entire urine can be examined,

whereas only minute portions of blood can be tested. It is believed that the indirect proof of bacillemia by bacilluria will be of great importance in investigations on the hematogenic dissemination of tuberculosis in the organism.

In discussing the question as to whether a latent tuberculous focus can be activated by a single *x-ray* examination of the lung, N Tsamboulas (Munchen med Wchnschr 79 671 (Apr 22) 1932) relates that occasionally apparently healthy persons, who were examined for a health certificate or for similar purposes, showed pulmonary symptoms shortly after the x-ray examinations. The further observation of such patients led to the assumption that a latent tuberculous process had become activated and that the irritative action of the x-rays was probably responsible for this activation. In order to gain some insight into this problem, the reactions that followed the routine roentgenoscopy of the thorax of patients with manifest tuberculosis were carefully observed.

From this study it was found that there was always an increase in the sedimentation speed of the erythrocytes, also an increase in globulin and in fibrinogen, and a higher basal metabolic rate. In some cases there also was a slight increase in the temperature. Roentgenoscopy of the thorax of healthy persons did not produce these changes. On the basis of these observations, it is possible that in some latent cases of tuberculosis the irritation produced by roentgenoscopy is sufficient to produce a focal reaction and thus lead to the manifestation of the disease. This assumption seems the more justified when it is considered that exposure to the sun's rays or the irritation produced by parenteral administration of protein is occasionally followed by a first manifes-

tation of pulmonary tuberculosis in apparently healthy persons.

C H Kibbey (Am J Pub Health 22:360 (Apr) 1932) reports that his experience has shown that *coal miners* die from tuberculosis with nearly 3 times the frequency of the average for total population and have a mortality rate more than $2\frac{1}{2}$ times that of surface workers. Expressed in deaths per thousand persons annually, the rates are: coal miners, 1.28, ore miners, 1.14; surface workers, 0.46, total population average, 0.44, dependents, 0.36. That the etiology of tuberculosis is in some way intimately bound up with *calcium metabolism* appears to be reasonably certain. Calcium metabolism, regardless of diet, is impossible in the absence of sunlight. The author tentatively suggests that high death rates from tuberculosis among ore and coal miners might more reasonably be attributed to their deprivation of sunshine than to a condition which apparently does not influence other respiratory diseases.

PATHOLOGY—An attempt was made by J N Cumings (Lancet 1 983 (May 7) 1932) to *cultivate the tubercle bacillus* from pathologic materials on Corper's potato medium and Hohn's egg medium. The egg medium yielded more than twice as many positive cultures as the potato medium and a positive culture was obtained in only about 50 per cent of the cases in which the tubercle bacillus was demonstrated by direct examination or guinea-pig inoculation. Blood culture was performed in cases of tuberculosis, multiple sclerosis and lymphadenoma, and in no case was a positive result obtained.

W. Unverricht and S. Dosquet (Ztschr f Tuberk 63.338 (Feb) 1932) report their experiences with *Lowenstein's culture method*. In 91

patients with pulmonary tuberculosis the culture method gave negative results in all but 1 case, in which severe tuberculosis occurred during puberty. In 16 persons without tuberculous disease, the culture tests were likewise negative.

Two experiments are described by L. Mishulow and W. H. Park (J. Prev. Med. 6:95 (Mar.) 1932) which seem to indicate that there is rapid localization of the *tubercle bacilli* inoculated into the blood stream of rabbits, as shown by the tremendous decrease in their number between 12 and 24 hours after inoculation, and the steady decrease up to the fourth day. The organisms persisted in the blood stream throughout the entire course of the infection, although they fluctuated in number from day to day. There was a marked rise in numbers on the day of death. This would justify the conclusion that there is a steady dissemination of the tubercle bacilli from the local lesion into the blood stream.

L. Popper (Deutsche med. Wchnschr. 58:89 (Jan. 15) 1932) states that *tubercle bacillema* develops after acute febrile diseases, evidently as a manifestation of the activation of a resting tuberculous process. Whether the tuberculosis will then become generalized cannot always be foreseen, but frequently the activation is only temporary. This is probably dependent on immunity conditions. The results obtained with Lowenstein's culture method indicate to what extent acute febrile conditions activate latent tuberculous processes.

C. Oestreich (Beitr. z. Klin. d. Tuberk. 80:187 (June) 1932) found that in tuberculosis an abundance of complicated details can be observed in the blood picture and that its evaluation is possible only if all these details are taken into consideration. It is almost impossible to designate changes that

are characteristic of the hemogram of tuberculosis, or to detect regular changes during the course of the disease as are noted in many other disorders, particularly in acute infections. But still there are certain characteristics. In active tuberculosis there is usually an increase in the leukocytes and in the blood platelets, a decrease in clinically manifest disorders is usually an unfavorable sign.

Similarly to be estimated are normal numbers in patients who are severely ill, for in these the absence of hyperleukocytosis and of hyperthrombocytosis indicates insufficient mobilization of the defense apparatus of the organism. In the majority of these severe cases, anemia is likewise present as a sign of toxic inhibition of the function of the bone-marrow. Especially unfavorable is the condition when the qualitative blood picture presents a lymphopenia and when the neutrophilic leukocytes show nuclear displacement or toxic impairment. A favorable sign is usually an increase in the lymphocytes, for it develops during the healing process of tuberculosis and, as a rule, persists for long periods. Rare and prognostically unfavorable hyperlymphocytosis is to be differentiated from the first form by the frequent pathologic forms (plasma cells) that are detectable in the qualitative hemogram. This unfavorable hyperlymphocytosis is probably the hematologic sign for the involvement of the lymph nodes. Toxic changes in the leukocytes, if present only in some cells, seem to indicate (with reservation) a cavernous disintegration, but when present in the great mass they indicate injury of the bone-marrow. A considerable increase in the eosinophile cells is always a favorable sign.

The significance of the hemogram for the diagnosis of tuberculosis is further discussed by Oestreich, but stresses that

it has value only if all other clinical signs are also considered. The hemogram is frequently of great importance in deciding whether a tuberculosis is cured, for instance, whether pneumothorax therapy can be discontinued. When the numbers of leukocytes and of blood platelets are normal, when the neutrophilic leukocytes show neither toxic impairment nor pathologic nuclear displacement, and when the numerically somewhat increased lymphocytes do not show pathologic forms and hardly any young forms, cure can be assumed, in the absence of clinical signs.

It is shown by P. Kallos (*Ibid* 79 688 (Apr) 1932) that a changed culture medium is capable of modifying the *morphologic characteristics of the tubercle bacillus* considerably. When oil was used in the culture medium there were in the oil layer numerous peculiar forms, *viz*, unusually long, threadlike, acid-fast and alcohol-fast bacilli. Of 100 bacilli in the oil layer, 58 were longer than the average length that was noted in the cultures before oil was used. These unusually long bacilli were either straight or curved and showed an intense, partly homogeneous and partly granular coloration. The oil culture also contained numerous delicate, granular and some terminally branched bacilli. Gram staining revealed the described forms to be Gram-positive, but some showed Gram-negative granulation or deposits. There were also noted some free, Gram-negative granules, some of which appeared in chain-like arrangements. The bacilli that were found in the funnel-shaped downward projections from the top layer and also those found in the bottom sediment were morphologically normal. However, some of them showed marked granulation. Tests of the virulence on guinea-pigs

revealed that the bacilli in the oil layer as well as those in the downward projections and in the deeper portions of the cultures were fully virulent.

Cellular Studies.—F. R. Sabin (*Am Rev Tuberc* 25 153 (Feb) 1932) reports that recent methods for studying living cells of blood and connective tissues have opened up a new period in experimental pathology, and the growing realization of the importance of cellular reactions to immunity makes these developments timely.

The first studies of this new period were made with the so-called vital staining of cells in which certain dyes were repeatedly injected into the living animal. Analysis of this material demonstrated that such dyes as were effective reached the cells in the form of particulate matter and therefore were a gauge of phagocytic activity. The dyes used in the supravital technic have a more complex reaction. They are applied to living cells which have been taken from the body and thus the method is allied to that of tissue culture.

The advantage of the supravital technic to experimental pathology consists in the fact that the survey of the living cells of the connective tissues can be made at necropsy and more data obtained concerning specific cellular responses to pathologic agents than is visible in sections. In the study of fresh scrapings made from tuberculous lymph nodes of man and from the early lesions in experimental tuberculosis in rabbits, it appears that the typical epithelioid cell is a modified monocyte. The living epithelioid cell is characterized by a large rosette, occupying the center of the cell, and thus accentuating the position of the centrosphere, this rosette is made up of the same type of vacuoles that characterize the monocyte, but they are reduced in

size and at the same time are vastly increased in number

On the basis of reports in the literature and of his own observations, H. Straub (Ztschr f klin Med 121 515 (Aug) 1932) calls attention to a form of pulmonary tuberculosis that so far has hardly been given consideration, *viz*, the *round tuberculous foci of the lungs*. The foci are homogeneous, sharply defined and round, the size of a coin, and they occur either isolated or in large numbers in entirely reactionless surroundings. The foci take an unusually torpid course. They may remain entirely stationary for years, even when in addition to them there develops in the lungs a progressive or even a fatal tuberculosis. However, the prognosis of the foci is not entirely favorable, for they may become progressive after a long time and may break down and form caverns. The foci do not represent the first extensive tuberculous infection, since in addition to them there also are remnants of old disseminations or of old cirrhotic processes. Considered from the pathologico-anatomic point of view, they are caseous calcareous foci with a connective tissue capsule. The round foci are considered a rare, further development of focal exudative inflammations, which are isolated by connective tissue growing around them. All focal exudative forms are capable of becoming transformed in this manner, especially early infiltrates, and also perifocal inflammations around older foci, hematogenic reinfections (late infiltrates) and secondary infiltrates. Because of the slight response to external influences treatment is useless, but since the foci present a constant danger, they require regular control.

Chemistry of Lipoids—R J Anderson (Physiol Rev 12 166 (Apr.)

1932) The chemical composition and biological reactions of the various *lipoid* fractions, such as phosphatide, acetone-soluble fat, and wax, have been studied and the results of this work indicate that the bacillary lipoids occupy a unique position. Chemically, they differ decidedly in composition from the usual plant and animal lipins and they possess interesting biological properties.

One is forced to conclude from consistent results obtained in the analyses of all of the lipoid fractions that the acid-fast bacteria elaborate a series of new higher fatty acids. These acids are either liquid at ordinary temperature or low melting solids and the higher members are optically active. Whether the optical activity depends upon a ring structure similar to that of the chaulmoogric series cannot be determined from the data now available, and it remains a problem for future research to determine the chemical constitution of these interesting compounds. The constant recurrence of *isomeric hexacosanic acids* in all the fractions is noteworthy. At least 1 unsaturated hexacosanic acid is present and several isomers of solid saturated hexacosanic acids have been found including the normal straight chain acid. The optically active phthioic acid belongs to this group.

Phthioic acid possesses specific biologic properties but it cannot be stated definitely at this time that the biological activity is due to the acid itself, since it may depend upon traces of other substances associated with this acid fraction. However, the activity remains after numerous fractionations in high vacuum of the methyl ester.

The *fat fraction* which is soluble in cold acetone represents a mixture of free fatty acids and neutral fat. The neutral fat is not a true glyceride be-

cause it yields only a very small amount of glycerol on saponification. It is apparently an ester of fatty acids with some higher polyhydric alcohol, but the latter substance has not yet been identified.

The *phosphatides* and the so-called purified wax contain large amounts of polysaccharides which differ not only in biological reactions but also in their chemical composition. The polysaccharide contained in the phosphatide gives no precipitin reaction with immune serum and on hydrolysis it yields inositol, mannose and some other sugar which has not yet been identified. The polysaccharide isolated from the wax gives a precipitin reaction with immune serum and on hydrolysis it yields mainly d-arabinose, mannose and galactose, together with some other unidentified sugars.

The principal constituent of the wax fraction is a very stable, snow-white, amorphous substance which provisionally has been designated unsaponifiable wax. The substance possesses the properties of a higher hydroxy acid and it is acid-fast.

The lipid fractions apparently contain no sterols.

COMPLICATIONS — Therapeutic Abortion.—C. B. Ingraham (Am J Obst and Gynec 23:1 (Jan) 1932) reports that in the selection of cases of pulmonary tuberculosis in which pregnancy is to be terminated the patient must be studied individually. As it is impossible to foretell the result, some authorities believe that, to be on the safe side, the uterus should be emptied in every case. However, this policy would frequently result in unnecessary sacrifice of the infant.

Any woman with active pulmonary tuberculosis or in whom pulmonary

tuberculosis has been but recently arrested will run a great risk if she becomes pregnant, as the combination of pregnancy, labor, and the puerperium may prove fatal.

In 23 of the cases reviewed, a curettage, about the simplest procedure possible, was done. The results in 3 cases are unknown. Fourteen (70 per cent) of the patients were benefited, 4 (20 per cent) were not benefited, and 2 (10 per cent) died. The next best results were obtained with the use of the dilating bag, which was followed by improvement in 2 cases (66.6 per cent) and death in 1 case (33.3 per cent). Vaginal hysterotomy, splitting of the cervix and removal of the fetus and placenta, which was done in 2 cases, was followed by improvement in 1 case and no improvement in the other. Of 4 cases in which abdominal hysterotomy was done, no improvement followed in 1 case (25 per cent) and death occurred in 3 cases (75 per cent). There is no doubt that the more serious operations, with shock, loss of blood, and a stormy convalescence are to be avoided if possible. In 6 cases in which resection of the fundus was done to combine sterilization with therapeutic abortion, improvement resulted in 5 (83.3 per cent) and death in 1 (16.6 per cent).

In 9 cases the abortion was effected under nitrous oxide anesthesia; in 5, under chloroform, in 4, under ether, in 1, under ethylene, and in 19 under spinal anesthesia, the latter being preferred. In 11 patients the pulmonary lesion was slight, in 7, moderately advanced, and in 16, advanced. In 5, the symptoms were severe at the time of the operation and death resulted. The effect of pregnancy on the patient with active pulmonary tuberculosis is generally so unfavorable that the pregnancy should be

interrupted while there is still a chance for improvement

Pregnancy—F L Jennings, E S Mariette and J C Litzenberg (Am Rev Tuberc 25 673 (June) 1932) believe that 6 months after labor is a sufficient time for any harmful effects of pregnancy or labor to appear, and they, therefore, reviewed their full-term group of 27 tuberculous gravidas at that time with observations as follows 1 died, 3 became worse, 7 remained unchanged, 10 improved and 4 were discharged and are caring for their own homes Two others were delivered less than 6 months before the study was made, 1 of whom is improving and the other has shown a slight extension None of the women with minimal tuberculosis were harmed by pregnancy or labor However, pregnancy is not recommended for the tuberculous patient In fact, pregnancy in a tuberculous woman is to be avoided, however, when it occurs it must be dealt with either by interruption of pregnancy or by allowing the woman to go to term There have been gratifying results by carefully treating the tuberculosis while permitting the mother to go to term Out of 27 patients thus treated, only 2 have died The authors believe that pregnancy should be terminated when complications arise which would call for this procedure in a nontuberculous woman Emphasis is laid on the removal of the baby from the tuberculous mother immediately after birth, for the sake of both

C Waitz (Ztschr f Tuberk 63 343 (Feb) 1932) states that during gestation the tuberculin test shows a high percentage of positive reactions The increased sympathetic reactivity of the female organism during gestation is considered to be the cause of the new

tuberculous infection or of exacerbation of an old tuberculous focus

The general practitioner or the gynecologist alone cannot decide the advisability of interruption of the pregnancy on account of tuberculosis, cooperation with specialists in tuberculosis is necessary for adequate care and treatment in such cases

Articular Rheumatism.—Attention is called by W Lowenstein, A Strasser and A Weissmann (Wien Arch f inn Med 22 229 (Apr) 1932) to the fact that studies on the etiology of acute articular rheumatism have repeatedly pointed toward tuberculosis In recent years acute articular rheumatism has been considered as a manifestation of the action of the tubercle bacillus because a tubercle bacillema was noted in a considerable number of such cases Statistical investigations on the frequency of the concurrence of articular rheumatism with tuberculous disorders, however, indicate a great rarity of such a concurrence, *viz*, only 1 per cent Blood cultures were made in 51 cases of articular rheumatism and revealed a tubercle bacillema in 34.4 per cent of the cases However, the concurrence of tubercle bacillema and articular rheumatism does not necessarily indicate a causal connection between the two conditions, and a critical evaluation of the material does not justify the assumption of a causal relation. Infectious arthritis develops on the basis of a sensitized mesenchyme and the sensitization, in turn, may have been produced by any infection, including tuberculosis

Heart Displacement.—From a review of the literature C Clayson (Edinburgh M J. 39.121 (Mar) 1932) reports that the main causes of cardiac displacements in pulmonary tuberculosis are fibrosis and pleuropericardial adhe-

sions, associated or not with a previous pleural effusion. Persistent afebrile tachycardia is not necessarily an indication of active disease and may be due to a displaced heart. When the x-rays show a displaced heart, treatment should not be postponed until symptoms occur. A trial should first be given to breathing exercises, and then, if embarrassing symptoms develop, to phrenic evulsion. Displacements of the heart may possibly be prevented by the systematic practice of breathing exercises, begun as early as is judged to be safe.

Malignancy.—In reviewing the literature of *breast cancer* associated with tuberculosis, C. Pana (Policlinico (sez chir) 39 155 (Mar) 1932) states that (1) a neoplastic proliferation may appear in a breast which has been tuberculous for a long time, (2) the tuberculous lesion may occur in an early developed tumor, (3) the two diseases can occur simultaneously with or without the development of one stimulating that of the other.

Bilateral tumors are caused by malformation of embryonic segments, lesions of the spinal medulla of a metameric type, as well as generalized neoplastic diathesis. A form of tuberculosis associated with carcinoma was found only in the left breast. In the same breast the notable quantity of tuberculous nodules, the great extension of the process, and the marked existing sclerosis induced the belief that the tuberculous process dated far back and preceded the appearance of the neoplasm. The lack of cutaneous and perivascular tuberculous lesions indicated that the tubercle bacilli did not enter the breast by the lymphatic route or by the blood stream. Although there was no evidence of it, penetration undoubtedly occurred through the milk ducts.

On the basis of an extensive review of the literature and observations of his own, V. Pettinari (Ann ital di chir 11 140 (Feb 29) 1932) reports that *cancer* and tuberculosis are morbid processes of a different nature which occur at different ages and develop most frequently in different organs in persons of a different constitutional make-up. Sometimes, however, they may co-exist not only in the same organism, but also in the same organ. Tuberculosis may act as a chronic stimulus to neoplastic growth. When tuberculosis and cancer are found together, the tuberculosis has usually preceded the cancer. Each lesion develops independently of the other. However, the cancer may invade the tuberculous tissue. In so doing, it seems to act as a stimulus to the tuberculous lesion. There are records of cases in which widespread metastasis of a malignant tumor was accompanied by the miliary dissemination of tuberculosis. Tuberculosis undergoes no change in its virulence because of the presence of the cancer. Bacilli isolated from neoplastic tissue have produced typical lesions on inoculation. All of the evidence seems to disprove an antagonism between the two processes.

The literature relative to the association of *carcinoma* and tuberculosis is reviewed by F. G. Cooper (Am Rev Tuberc 25 108 (Jan) 1932). This includes several hundred reports of cases in which the two diseases were present in the same organ. In addition, 24 cases observed at The Mayo Clinic, and never reported before, in which malignant and tuberculous lesions were intimately associated are presented. The frequency of this association is fairly convincing evidence that the two diseases are not antagonistic. Tuberculosis may exist with all degrees of malignant

tumor The finding of tuberculosis in an organ or biopsy specimen does not exclude the possibility of malignant tumor

Modification by Other Diseases.—Of conditions that create a predisposition for tuberculosis by reducing the resistance of the organism, A. Bacmeister (Deutsche med. Wchnschr 58 766 (May) 1932) mentions *undernourishment* and *psychic influences*, particularly worries. However, diseases such as pernicious anemia and cancer, which likewise weaken the organism, do not favor the development of tuberculosis. Of the circulatory disorders, those that produce a stasis in the pulmonary circulation, such as mitral defects, protect against tuberculosis, whereas deficient perfusion with blood predisposes to tuberculosis. In regard to mixed infections, they may cause acute exacerbations of the tuberculosis, but this factor was formerly given undue prominence. *Bronchitis* as well as *influenza* predisposes to tuberculosis and also exacerbates an existing tuberculosis. However, the former assumption that measles and whooping cough were particularly dangerous for an activation of tuberculosis is, in view of recent observations, no longer justified.

In regard to the relationship between *syphilis* and tuberculosis it is stated that it cannot be demonstrated that syphilitic patients are more predisposed to tuberculosis than other persons, but if a new syphilitic infection is acquired in the course of an active tuberculosis, the prognosis of the latter becomes more unfavorable. Of the metabolic disorders, *diabetes mellitus* is the most frequent complication of tuberculosis. The diabetes is generally the primary and tuberculosis the secondary disease. The combination of *gout* and tuberculosis is

extraordinarily rare, so that formerly an antagonism was assumed between these two conditions. The concurrence of *obesity* and tuberculosis is likewise comparatively rare, but in constitutional obesity it seems to be somewhat more frequent than in acquired obesity. In connection with obesity, it is mentioned that reducing diets and also the use of hormone preparations for reducing may activate tuberculous foci. The frequent concurrence of pneumonokoniosis and of pulmonary tuberculosis is known, but recent observations indicate that the chemical character of the dust, especially the content in silicic acid, is more important than the size and form of the dust particles.

DIAGNOSIS.—V. Clausen (Hospitalltid 74 1084 (Nov 5) 1931) examined the *stomach lavage water* in 136 adults and 152 children and found tubercle bacilli in about 50 per cent of the adults with "abacillary" pulmonary tuberculosis and in about 55 per cent of the children with pulmonary tuberculosis.

On the principle of *Lowenstein's technic*, C. Weatherall (Lancet 1.980 (May 7) 1932), made cultures from the heart blood of 40 tuberculous guinea-pigs. Acid-fast bacilli failed to grow. From 30 sanatorium cases of pulmonary tuberculosis, blood clot was digested with pepsin by the method of Jousset, after sterilization with acid, culture of the residue on egg medium failed to grow tubercle bacilli. From small quantities (0.5 cc) of heart blood of 63 tuberculous guinea-pigs cultured in veal broth by the method of Dreyer and Vollum, 1 primary positive culture was obtained, and in 2 cases, subcultures on egg medium were successful. Blood from 15 tuberculous patients was injected into guinea-pigs. One animal, inoculated

from a case of advanced pulmonary tuberculosis, developed lymph node and generalized tuberculosis. The other 14 proved negative.

Attention is called by T. B. Magath and W. H. Feldman (Am J Clin Path 2 199 (May) 1932) to the fact that several recently devised methods of *cultivating Mycobacterium tuberculosis* are excellent and can be expected to yield a high percentage of growth in material in which the organism can be demonstrated in direct smear. When bacilli of tuberculosis cannot be demonstrated in direct smear in clinical material, fewer growths will be obtained on culture than can be obtained by inoculation of guinea-pigs. Although most acid-fast bacilli that grow on these special mediums will without doubt be virulent bacilli of tuberculosis, the only way positively to prove virulence and identify species is by inoculation of animals. For this reason, positive cultures are no more final than the finding of acid-fast bacilli by direct smear. These authors stress the point that while cultural methods are valuable and should be frequently used for demonstrating tubercle bacilli, inoculation of guinea-pigs remains the best method for proving the presence of virulent *Mycobacterium tuberculosis* in clinical material that is either known or not known to contain acid-fast bacilli.

A method of rapid *staining* of tubercle bacilli in sputum is discussed by P. Doglio (Gior di Batteriol e Immunol 8 243 (Mar) 1932) as follows:

The material is spread on a slide and Ziehl's carbolfuchsin applied to it, heating the slide until it steams, and afterward washing it thoroughly in running water. He then places it for from 40 to 50 seconds in a solution of his own brilliant yellow, 0.15 Gm., concentrated sulphuric acid, 10 c.c., alcohol, 20 c.c., and distilled water, 85 c.c. It is again thoroughly washed and dried with blotting paper.

The bacilli are colored red on a lemon-yellow background.

Three hundred tests revealed that (1) the method is more rapid than that of Ziehl, taking exactly half the time, (2) the tubercle bacilli are shown clearer and more numerous, thereby facilitating research, (3) the method is just as reliable as the Ziehl-Neelsen test, there were no negative results when the Ziehl-Neelsen test was positive.

Scintillating scotoma was noted by P. Braunstein and J. Stephani (Bull. méd. 46 440 (June) 1932) in 80 per cent of patients with pulmonary tuberculosis examined in an investigation covering several hundred cases. This type of scotoma manifests itself clinically in the form of an attack which starts with the appearance of a dark spot in front of both eyes. The spot extends accompanied by a vibratory motion, called scintillations, at its periphery and zig-zag colored lines until there is a considerable visual defect, frequently of hemianopic form. Sometimes it is even accompanied by headache, malaise, vertigo, nausea and vomiting. The attack, which lasts from several minutes to a quarter of an hour, resists all treatment and finally ceases completely. While it cannot be considered a pathognomonic sign, it should be placed among the list of classic general symptoms of pulmonary tuberculosis whether it occurs during the premonitory period or the early or the advanced stage of the disease. It not only is a reliable sign of pulmonary tuberculosis, but also has a certain prognostic value, as its presence and persistence during the course of the disease indicates, better than many other tests, a weakened resistance.

DIFFERENTIAL DIAGNOSIS.

—It is generally known that *tonsillitis* may precede the first manifestation of a

tuberculosis, as pointed out by H J Schmid (Schweiz med Wchnshr 62 497 (May) 1932) However, that this is considered either as an incidental concurrence or that the tonsillitis is thought to be the factor that led to the manifestation of the tuberculosis is not true for all cases .

Either may occasionally be true, but in the majority of cases the relationship between the pharyngeal symptoms and the tuberculous process is closer Against a mere accidental concurrence speaks the considerable frequency of this combination The theory that tonsillitis only causes the manifestation of the tuberculosis is contraindicated by the observation that not severe forms of tonsillitis precede the tuberculosis, but usually comparatively mild forms, in which difficulty in swallowing is the main symptom, and there is a noticeable discrepancy between the slight local symptoms and the severe general symptoms, particularly the fever In many instances this stage of the disease is not seen by the physician, but the anamnesis often reveals that an "influenza with sore throat" preceded the tuberculosis The relationship between tonsillitis and tuberculosis also has a reverse aspect, a chronic tonsillitis, by its increased temperatures, may simulate tuberculosis

Because this is generally known to physicians, there may be danger that a tuberculosis is overlooked It should therefore be kept in mind that a tonsillitis may mask a tuberculosis

PROGNOSIS.—S Magnusson (Hospitlstd 74 1219 (Dec 17) 1931) investigated 352 cases of active pulmonary tuberculosis and found that improvement occurs in the majority of cases without anemia at the beginning of treatment, including the cases with cavern (with and without collapse ther-

apy), while relatively few of the cases with considerable anemia improve

M Gerson (Ztschr f Tuberk 63 327 (Feb) 1932) found that (1) a marked *increase in the sedimentation speed* from 2 to 8 weeks after beginning of the *salt-free diet is a favorable sign* This initial increase in sedimentation speed makes the prognosis the more favorable the earlier it develops and the quicker it disappears again, (2) the protein content of the salt-free diet does not have a direct influence on the initial increase in the sedimentation speed, for it develops whether the salt-free diet contains large amounts of protein or is deficient in protein, (3) the absence of the initial increase in the sedimentation speed generally indicates an unfavorable prognosis, the more so if the patient's general condition is poor, (4) short interruptions of the dietary treatment change the behavior of the sedimentation curve, and when the diet is resumed again, there may be once more an "initial" increase, (5) an extremely slow increase of the sedimentation speed at the beginning of the salt-free diet can, with certain reservations, be taken as an indication that the course of the disease will be slow Elimination of small amounts of sodium chloride supports this diagnosis, elimination of large amounts contradicts it, (6) it may be an unfavorable sign if, after the initial increase, the sedimentation speed decreases only slowly or not at all, (7) if complications develop, or in case of relapse, there is a temporary increase in the sedimentation, but this is noticeable whether the patient has received dietary treatment or not

Since the sedimentation reaction has only a qualified diagnostic applicability it should be considered together with all other clinical observations, but never

alone In connection with the clinical aspects, the blood picture, the sodium chloride control and the x-rays, the speed gives valuable information about the otherwise not recognizable reaction capacity of the organism of patients receiving dietary treatment

TREATMENT.—Regular and repeated estimations of the blood sedimentation rate is strongly urged by H Roche (Brit M J 1 466 (Mar 12) 1932), and that the information provided should be carefully considered when prescribing rest and exercise, particularly in patients whose temperatures and pulse rates are within normal limits It is his opinion that attention to this point will tend to minimize the risk of relapse

Evidence is presented by P. V. Benjamin (Tubercle 13 145 (Jan) 1932) that sanatorium treatment alone without additional methods can, as a rule, be considered sufficient for pulmonary tuberculosis in its earlier stages In fact, the additional methods which are of such value in Stage III cases do not appear to be necessary in Stage I and II cases, in order to render the patients bacilli-free Only a small percentage of patients can hope to be discharged free from tuberculosis in the Stage III group by sanatorium treatment alone In a large number of these cases additional methods of treatment are necessary such as artificial pneumothorax, cauterization of adhesions, thoracoplasty and phrenic avulsion. When these methods are adopted, the disappearance of bacilli is over 100 per cent better than that obtained by sanatorium treatment alone

Change of Altitude.—Attention is called by R Campbell (Schweiz med Wchnschr 62 472 (May) 1932) to the fact that tuberculosis in persons who live on high mountains is often not favor-

ably influenced by the high altitude climate For such patients a sojourn in the lowlands is often much more beneficial After a stay of several months in the lower altitudes, a return to the high mountains is again a new stimulation and may have a curative influence Tuberculous patients who have stayed in the high mountains for a prolonged period and who no longer show favorable effects from the high altitude climate would perhaps profit by a repeated change between higher and lower altitudes The changes in altitude, not the altitude itself, is the most curative factor However, one does not wish to discredit the therapeutic value of the high mountain climate, on the contrary, for the majority of patients with tuberculosis, it is highly effective

Iodine.—A Sylla (Beitr z Klin d Tuberk 80 51 (May) 1932) reports his own observations with iodine therapy of pulmonary tuberculosis If suitable iodine preparations are used, this treatment can be employed in all forms of pulmonary tuberculosis, except in cases with hemorrhages and in those with new infiltrates The iodine therapy effects an improvement in the general condition and facilitates expectoration and respiration In cases of minor severity it effects increase in weight, reduction of temperature, decrease in erythrocyte sedimentation speed, and increase in hemoglobin, in erythrocytes, and in lymphocytes The bacilli decrease, provided large doses of iodine are given, if small doses are given, this result is rare In purely fibrous and in productive cirrhotic forms without bacillary dissemination, small doses are sufficient After 10 injections it is advisable to interrupt the treatment for about 2 weeks and then repeat the series of injections several times.

Most suitable are intravenous injections, but if the venous system is impaired, intramuscular injections may be given, which, however, are less readily tolerated by emaciated patients. In cavernous cirrhotic processes without marked dissemination of bacilli, the small doses are likewise sufficient. But if the bacillus content of the sputum is to be considerably decreased, larger doses are required. If caution is necessary, the same dose should be given several times in succession before it is increased. The decrease of the tubercle bacilli in the sputum cannot be considered a direct antibacterial iodine action, but it is probable that the iodine effects detoxication of the organism by binding the tuberculous toxins. By eliminating the paralyzing action of these toxins on certain cells, such as the leukocytes, lymphocytes, histocytes and epithelioid cells, the defense apparatus of the organism is mobilized, and thus a larger number of tubercle bacilli are destroyed.

Oxygen.—The effects of the inhalation of 50 per cent oxygen in an oxygen chamber for periods of 1 to 4 months, were studied by A. L. Barach and D. W. Richards, Jr. (*Am Rev Tuberc* 26:241 (Sept) 1932) in 5 patients with severe, exudative, pulmonary tuberculosis. No retarding effect on the lesion was detected.

SURGICAL TREATMENT.—Confirmation is given in many articles of the value of collapse therapy in the treatment of pulmonary tuberculosis, and collapse therapy, whatever the form that may be adopted, is classified as a surgical procedure. Such classification immediately emphasizes the necessity of close cooperation between surgeon and phthisiotherapist. The best results can be obtained only when the

surgeon too becomes intimately acquainted with all the phases of tuberculous pulmonary pathology, and shares in the responsibility of choice and method of procedure.

J. W. Gale and W. S. Middleton (*Wisconsin M J* 31:91 (Feb) 1932), in discussing what surgery has to offer the patient with pulmonary tuberculosis, states: "The patient suffering from pulmonary tuberculosis is no longer shackled to one form of treatment. Physiologic rest accomplished through a regulated sanatorium regimen has been the sole method to which our predecessors had access. It still remains one of the most effective weapons in our armamentarium for combating the disease, but time, along with the increasing knowledge in the treatment of these cases, has clearly proved that in certain cases its employment as the only procedure is both inadequate and ill-advised. Many patients who in the past would have remained chronic invalids, or have been doomed to an early death, are now receiving the benefits of very valuable and effective adjunct procedures.

"With any surgical procedure the physician is primarily interested in the restoration of function. At times, obviously, it is a matter of serious decision as to whether the advantage of a given method of treatment is sufficient to warrant the sacrifice of function. On the other hand, it may be generally accepted that a suspension of function, temporary or permanent, offers much greater chance for the control of pathologic process than a maintenance of such function. It, therefore, behooves the physician to consider the contemplated procedure, first in the light of its revocability. From this standpoint, the available surgical measures for the treatment of pulmonary tuberculosis may be

divided into 2 groups—revocable and irrevocable

- A Revocable
 - 1 Pneumothorax
 - 2 Temporary phrenic block
 - 3 Temporary intercostal block
- B Irrevocable
 - 1 Phrenic exeresis.
 - 2 Scalenotomy
 - 3 Intercostal neurectomy
 - 4 Pneumonolysis { Extrapleural,
Intrapleural
 - 5 Thoracoplasty

“The major aims in the surgical treatment next arrest attention. It is not surprising, since rest is the accepted principle in the treatment of this disease, that surgery should draw its first line of attack with the view of immobilizing the thoracic cage. Success in this effort would distinctly limit the blood and lymph flow from the affected lung in addition to actually reducing the circulation of air, which favors the spread of the infection. The added mechanical factor of relaxation and collapse of the involved lung with the elimination of the infected secretions will decrease the toxemia and effectively promote the healing process. On the basis of these aims, a division may be effected into motor and mechanical operations. These divisions overlap in that most operations of a mechanical nature interfere with mobility

- A MOTOR
 - 1 Phrenic block, temporary or permanent
 - 2 Scalenotomy
 - Intercostal neurectomy
- B MECHANICAL RELAXATION OR COLLAPSE
 - 1 Pneumothorax [*or associated collapse and compression methods—Ed*]
 - 2 Pneumothorax followed by intrapleural pneumolysis
 - 3 Extrapleural pneumolysis
 - 4 Thoracoplasty”

It is believed that the above constitutes a fair summary of the basic surgical procedures at present available and given

sanction by the conservatively progressive men actively engaged in this work. In order that the greatest benefit to the multitudes of tuberculous may be obtained, the profession at large must have brought to it directly, and by repetition the evidences of the benefits of these procedures; and efforts must be made to secure cooperation of private and governmental organizations, from local to national, whereby the benefits may become generally available, and not only be received by a fortunate few.

Along these lines a survey has been made by J B Hawes, Jr and M J Stone (J A M A 98:2048 (June 11) 1932) of collapse therapy of pulmonary tuberculosis in the New England States. Since this area represents in all probability conditions obtaining in the metropolitan areas of the country at large, it indicates what must be done in the way of professional, charitable and governmental cooperation. Their justification for the study, from the standpoint of evaluation of the procedure, is expressed thus: “A procedure by which the diseased lung is put at rest not only prolongs life, reduces the mortality from this disease and shortens what would otherwise be a long period of invalidism, but of still greater importance, hastens the patient’s return to industry.”

From the standpoint of the general public, and the availability of these approved measures for their benefit, the survey is justified by the statement that: “Certainly in New England, and all over the eastern part of this country, except in the great tuberculosis centers, such as Saranac Lake and Liberty, N Y, and Asheville, N C, the medical profession seems to hold aloof from these procedures and look on them rather as measures of last resort. Compare pneumothorax in tuberculosis, for

instance, as the most common and certainly the simplest means of putting the lung at rest, with insulin in diabetes and with liver and liver extracts in the primary anemias

Physicians are perfectly well aware of the great good that the latter two can accomplish. Yet, for the obvious reason that for every case of primary anemia there are hundreds of cases of pulmonary tuberculosis, the total of good that can be done in the former fades into insignificance when compared with what can and should be done by collapse therapy in tuberculosis when in suitable hands and in properly selected cases.

. . . It is probably because the average physician has no experience in such procedures and is not equipped to carry out these methods of treatment that he is loath to recommend them to his patients. The reaction of many physicians when the consultant suggests that pneumothorax is indicated, is too apt to be, 'Oh, no, Doctor, she hasn't reached that stage-yet.' In our own practice this has been only too frequent an occurrence. Thus, the family and the patient are persuaded against it and much precious time is lost while the disease attacks the other lung, after which all possibility of putting one lung at rest is gone forever."

The direct suggestions, worthy of consideration are as follows:

"1 Tuberculosis and its diagnosis and treatment should be given distinctly more attention in medical schools than is now the case"

[This will prove to be a difficult situation to adjust, because strong opposition will be made to the curtailment of other subject hours in the scheduled curriculum. The second suggestion that follows, if generally accepted, would provide a more practical and impressive opportunity for the continued dissemination of information when carried out—Ed.]

"2 Every general hospital, large or small, should admit tuberculous patients for study, diagnosis, and operative treatment, if neces-

sary. Further, each general hospital should have on its consulting staff at least, which in every case could be easily arranged, someone who could speak and act with authority on such matters.

"3 Every tuberculosis hospital and sanatorium should have an x-ray plant or easy access to one and should be otherwise equipped to carry on compression treatment, while, of course, most important of all, the members of its staff should be trained in the selection of cases and in the technic of pneumothorax. Phrenicectomy and thoracic operations, of course, require the services of a surgeon trained in thoracic surgery.

"4 The subject is of such real importance that it should form part of the yearly program of every county and local medical society. We have attended many meetings where such matters were discussed, but either they were for a selected group of men engaged in this work, or, if for the general medical public, of such a technical and detailed nature as to be practically devoid of interest and value.

"5 We feel that the superintendents of tuberculosis hospitals and sanatoriums should not only write and publish articles on this subject, but invite and urge the local medical profession to attend meetings where clinical demonstrations could be held and the whole subject of the modern treatment of tuberculosis presented in a simple and practical way."

Pneumothorax Therapy.—The general writings continue to bear evidence of the extreme value of this procedure in the treatment of pulmonary tuberculosis. Its more general use is a great advance. With increasing use of this agent, problems connected with its employment are appearing in larger numbers, and are subjected to analytic study for solution. These have to do with the choice of cases, the appearance of effusions during the course of treatment, overcoming the barriers to collapse presented by adhesions, overcoming the tendency to reexpansion and parietal fixation occasionally seen, the duration of continuance of the pneumothorax treatment, and the procedure during the period of reexpansion.

Giving credit to L S T Burrell (Tubercle 13 4 (Oct) 1931), N Bethune (Canad M A J 27 36 (July) 1932) quotes "If artificial pneumothorax can save the lives of many patients who failed to improve under other treatments, how many more would it save if employed in the earliest stages before adhesions have formed and while the disease is unilateral? I think that in the near future all early cases of unilateral disease will be treated by pneumothorax unless there is some definite contraindication. When once crepitations are heard, the case cannot be regarded as in the early stage, and certainly pneumothorax should be advocated. It is only a waste of time to try other methods, because, although it is true some do well, many do not, and even those who do well at first are very liable to relapse."

Bethune (*loc cit*) states that "Barnes and Barnes, studying 1454 cavity cases, found a mortality rate of 80 per cent within 1 year, and 90 per cent within 5 years. He found a total mortality rate of 78.2 per cent and a death rate of 61.7 per cent for the first 2 years. Of the small surviving group, 69.1 per cent were totally or partially disabled, and only 4.1 per cent of the whole number were working. As a contrast to this, "Under collapse treatment by pneumothorax, of 86 laborers, 61.6 per cent had *regained* and *retained* their working and earning ability after 1 to 5 years, only 21.1 per cent were incapacitated and 17.4 per cent had died."

Where the patients studied have been under treatment in a single institution in which the only change from the long recognized "food-rest routine" has been the institution of surgical measures, an unusual opportunity is presented for an evaluation of these surgical procedures

themselves, and again Bethune (*loc cit*) avails himself of a group of such figures from the Northville Sanatorium, Mich., coming to him in a personal communication from E J O'Brien. "Northville Sanatorium had in 1927 a mortality rate of 25.8 per cent and only 8 per cent of all cases were discharged as arrested. In 1931, the mortality had dropped to 10 per cent and the arrested cases on discharge had reached 34 per cent. At the present time 77 per cent of all cases are under some form of collapse therapy."

The same author, bringing a summary from continental sources, quotes Bachmeister, who, speaking of the experiences in Swiss Sanatoria, says "Given a cavity the size of a cherry at the onset of sanatorium care, and unless that cavity has steadily shown a tendency to close, and does close, *or has been closed by artificial means* (*italics—Ed*), only 20 per cent of chances exist that the patient will be alive in 6 years, even with continuous sanatorium care."

Bethune's distribution of patients runs as follows. "No sanatorium today can call itself modern which does not have at least 50 per cent of its patients under some form of collapse therapy, a distribution of say 30 per cent pneumothoraces, 15 per cent phrenicectomies and 5 per cent thoracoplasties or extra-pleural wax-fillings, etc."

The appended diagram from Bethune (*loc cit*) gives graphically a working plan for the treatment of pulmonary tuberculosis by pneumothorax (see following page)

INDICATIONS—For the physician not broadly experienced, and for the sake of the patient, it is essential that the specific indications, so considered by those regarded as authorities, be set

SUMMARY OF THE MANAGEMENT OF UNILATERAL PNEUMOTHORAX—OTHER SIDE GOOD OR FAIR

X-ray every 6 to 8 weeks		Fluoroscope before and after each refill	
I—If technically efficient collapse		III—If technically inefficient collapse (adhesions)	
No fluid	Clear fluid	II—If spread on other side	
Bed 6 mos	Bed	Bilateral Pneumo—or phrenic	
Limited exercise	No exercise	Pus	
Maintain 3 to 5 yrs *	Aspirate and replace with air	No exercise	
Phrenic	If losing Pneumo	Pus without secondary organisms	
Let lung expand	Shorten intervals	Aspirate and replace with air	
	Raise pressure	If controlled	
	Phrenic	Maintain 3 to 5 years*	
	If base is adherent substitute oleothorax	If still uncontrolled	
	Drain oil in 2 years	Maintain pneumo Lavage with dyes or saline for 3 to 9 months	
		If still uncontrolled	
		Phrenic	
		Thoracoplasty (if other lung "Good")	
		Nontoxic	
		Pus with secondary organisms	
		Toxic	
		Maintain pneumo Lavage with dyes or saline 1 to 2 mos only	
		If still uncontrolled	
		Thoracotomy and phrenic	
		Cauterization possible and successful with good collapse	
		Phrenic	
		Maintain 3 to 5 years	
		Let lung expand	
		Thoracoplasty (if other lung "Good")	
		Cauterization impossible poor collapse	
		Phrenic	
		Thoracoplasty	
		Thoracoplasty (if other lung "Good")	

* The reply of Rist, of Paris, to those patients who complain of the length of time for Pneumothorax Treatment is "Yes, it takes longer than it does to die of tuberculosis"

down A Rutz (Zentralbl f Chir 58 2704 (Oct 24) 1931) expresses the opinion that it is not suitable for advanced exudative tuberculosis, in which the essential processes for cure, proliferative connective tissue activity and later evidence of contraction, are absent from the beginning. In early cases of this type, and this is most important, with the lesions particularly infraclavicular in situation, the process may be brought to an early arrest by the prompt institution of pneumothorax therapy.

H W Wunderley (M J Australia 1 74 (Jan 16) 1932) states that he believes every patient should be under observation for 2 to 3 months before such type of surgical work should be instituted, considering only 2 exceptions (1) where severe or repeated hemoptysis necessitates immediate action, and (2) in the advanced case where there can be no hope of cure except by some form of temporary or permanent collapse. With one lung comparatively healthy, and a lesion in the opposite side steadily progressing in spite of sanatorium treatment, the subject is regarded as one suitable for pneumothorax attempt. He believes that in unilateral cavity cases the earliest possible establishment of pneumothorax offers the best results. Among other indications for pneumothorax, he recognizes spontaneous pneumothorax, advising that here a controlled artificial pneumothorax should be substituted for it, and that in tuberculous pleurisy with effusion the fluid should be withdrawn and the pulmonary rest maintained by air, the subsequent details of this procedure being determined by the parenchymatous disease.

The problems of *introduction* involve intrathoracic pressure changes, with their effects on the great vessels, alter-

ing to some degree the physics of intrathoracic negative pressure as influencing auricular filling, and the effect on the contralateral lung where the mediastinum may be flaccid. J C Dundee (Am Rev Tuberc 25 469 (Apr) 1932) summarizes this stage of the procedure thus: "The sanatorium worker has a definite initial objective. With the least possible discomfort and risk to the patient, he seeks to obtain quickly the minimum degree of collapse of the lung that is conducive to the healing of all tuberculous infiltration and cavitation. The cavitation must be collapsed or obliterated before the treatment can be completely successful. This position of minimum collapse is then maintained with the longest refill interval that is consistent with healing."

Where this obliteration of cavity and complete collapse cannot be obtained directly by the use of pneumothorax alone, the measures of adhesions severance, internal and external, are being given consideration, if x-ray examination suggests that they may be of a "suspension" type, *i e*, where string-like or of moderate band size.

COMPLICATIONS—Adhesions—In reporting the results of **cautery pneumolysis** of adhesions complicating artificial pneumothorax, E S Welles (J. Thoracic Surg 1 601 (Aug) 1932) considers this phase of surgical therapy on the basis of "141 cases operated upon since 1928," "in the hope of advancing further the use of this very valuable operation as an aid to pneumothorax treatment."

The work was all done according to the Jacobaeus-Unverricht method, using the actual cautery. Work with the actual cautery was continued rather than making a change to endothermic methods, because "results continued to

be more and more satisfactory with the cautery as more skill was acquired in its manipulation. One of the most important factors in success with the use of the cautery is the use of very low heat, the tip never being heated even to a dull cherry red. This avoids too rapid cutting and the consequent danger of hemorrhage."

"As more skill is acquired, it is found that much larger and more extensive adhesions can be divided, and complete collapse of the lung has been obtained in many cases which at first were considered unsuitable for treatment. A considerable number of cases have been treated with complete success in which the x-ray films looked discouraging. It has become our policy to look into the chest with the thoracoscope in all cases in which there seems to be any possibility of cutting adhesions, even when the odds seem strongly against success."

The brief summary of the group of cases is made as follows

	No Cases	Per Cent
A Total cases attempted	141	
B No in which completely satisfactory collapse obtained	122	87
C Serous fluid present before operation	30	21
D Serous fluid present after operation (including C)	64	45
E No in which this was of serious consequence	9	6
F No which developed purulent effusion without mixed infection	6	4
G No which developed mixed infection—empyema (both recovered)	2	1.5

"Before pneumolysis, all of these cases of artificial pneumothorax were unsatisfactory, due to the presence of the adhesions.

"Of the number developing purulent effusions, none came to open drainage.

Two developed acute staphylococcus empyemas but recovered completely after repeated aspirations, without drainage, and both are now well. No case of hemorrhage occurred in the whole series, though it is fair to assume that in the series of 141 cases, as many as 500 individual adhesions have been cut."

A most interesting individual case, treated along the above lines of present day surgery, is reported by F. G. Chandler (*Brit. M. J.* 1 1118 (June 18) 1932). Such individual analysis has a particular value at this stage of the surgical development of phthisiotherapy, because of its consideration of a specific problem, which may have its counterpart and, therefore, prove a concrete help and stimulus in the practice of many others. As the writer says, "it illustrates the potentialities of methods of treatment the value of which are still unrecognized by large numbers, if not the majority of our profession. I must add that I am not advocating what follows as a routine procedure, as the opportunities for its applications may be few, but the indication is fairly definite—that action is compulsory when the patient is obviously declining—unless one is content to adopt an expectant attitude to the fatal end."

The patient was a child of 7, the father with advanced phthisis, having copious sputum, constantly positive for T. B., seen in December, 1930. In February, 1931, bronchopneumonic consolidation developed in the left lower lobe, and x-ray examination revealed a very large cavity in the left lower lobe, "and the appearances about the right hilum were very suspicious." Pneumothorax was attempted, but adhesions prevented closure of the cavity. Decision was made to attempt severance of the adhesions, and because of the temperament of the child, avertin was used as an anesthetic. This anesthetic was supplemented by gas-oxygen because not given in sufficient amount. "This considerably

increased the difficulty of the procedure, as the respiratory excursions were consequently exaggerated and the chest wall was in violent motion throughout the operation.

"Thoracoscopy revealed a wide maze of adhesions. In the belief that it was a question of completely collapsing the lung or leaving

adhesion with novocaine with the object of saving time. This, I believe, was a mistake, as every time the diathermy cutting wire was used, the spasm phenomena in the muscles of the chest wall occurred, which greatly increased the difficulty of the operation. When the resistance of the tissues became great, or

FIG 1

FIG 2

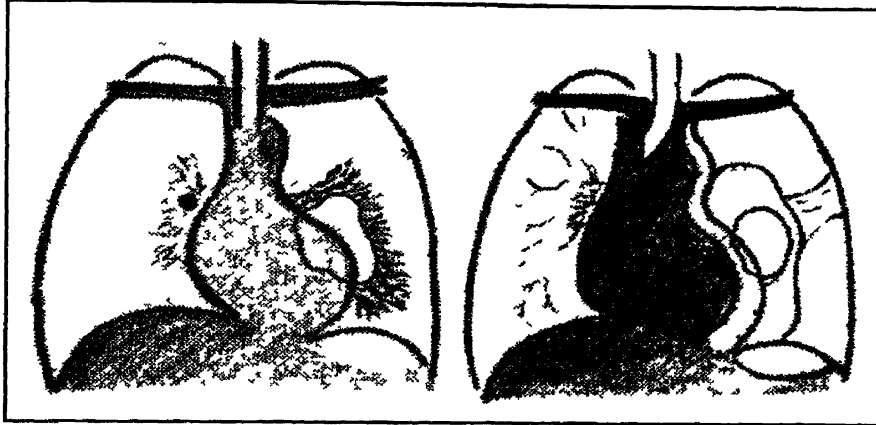


Fig 1—Appearance February 19, 1931. Showing cavity in left lower lobe, with infiltration around it. Doubtful shadows radiating from right hilum.

Fig 2—March 9, 1931. Showing artificial pneumothorax. Left lung partially collapsed. Cavity held open by adhesions.

FIG 3

FIG 4

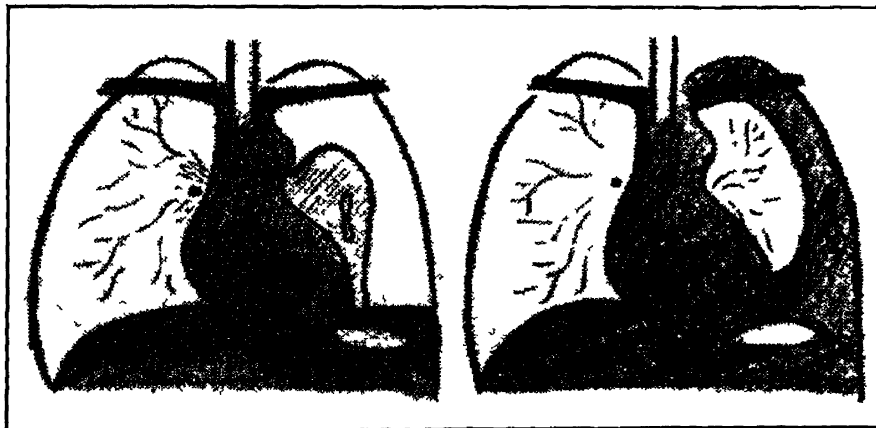


Fig 3—May 18, 1931. Adhesions have been cut. Cavity almost closed. Small amount of olive oil has been injected into pleural cavity.

Fig 4—July 27, 1931. Cavity closed. Lung kept sufficiently collapsed by oil. Appearance was same in February, 1932.

Figs 1 to 4 (J F McCarthy Am J Surg)

the child to die, it was decided to risk their division, this being justified by the issues at stake. The whole operation was done through 1 cannula. A direct-vision telescope was used, and alongside this were passed the diathermy electrode and the electrocautery. Both were used. As general anesthesia was being employed, I did not infiltrate the insertion of the

where they were thin, the electrocautery was used. All adhesions were divided, and the child returned to bed in good condition.

"Respirations had been so deep that much air was expelled from the pleural cavity, and the lung almost reexpanded, but subsequent refills produced an excellent collapse. The child so dreaded the refills that it was decided

to substitute an oleothorax for the pneumothorax *This was done gradually* (Italics—Ed) A year later the child was in good health, plump, bonny, and had gained over a stone in weight At the time of writing she is still in good health”

The illustrations graphically picture the progress of events

Suspended Cavity—E J O'Brien (J Thoracic Surg 1 603 (Aug) 1932) gives consideration to a study of the same subject and treatment by truly open **severance of adhesions**. He points out the difficulty of accurate estimation of the frequency with which adhesion severance is a necessity and because of this difficulty the impossibility of true evaluation of the method where applied Under his rigid method of selection of cases, a very small number under pneumothorax treatment have ultimately been subjected to pneumolysis, and considerable contrast is offered with the group presented by Welles

In discussing reports covering various aspects of collapse therapy he states

“Many writers report that their best results and most permanent cures following artificial pneumothorax treatment are effected in those patients in whom a maximum collapse of the lung is obtained They do not differentiate, however, between those patients in whom the maximum collapse is necessary to close cavities, and those in whom the cavities are closed after a partial or selective collapse It is not clear, either, from those reports whether those patients in whom only partial collapse was obtained were prevented from complete collapse by adhesions or other factors, or, if adhesions were the cause, whether these were such that might be severed or were too massive for successful treatment by operation There are a considerable number of patients in

whom the maximum collapse of the lung is neither necessary nor desirable, as the cavities will close, the sputum become negative, and the lesion heal with only a partial collapse Any statistics, therefore, that attempt to show the results of treatment under the various degrees of collapse should take these factors into consideration

“That it is desirable to obtain complete collapse of all forms of tuberculous cavitation as soon and as safely as possible is, of course, obvious As long as cavities remain open and the sputum positive, there is constant danger of hemorrhage and bronchogenic spread, as well as the extension of disease to other organs. In hanging cavities there exists, also, the possibility that the tug of adhesions on the cavity wall will cause its rupture with the production of spontaneous pneumothorax, serous effusion, or empyema During normal respiration in these patients the changing intrathoracic pressure prevents complete rest to the lung All these dangers are increased if the diaphragm on that side is functioning normally, for on inspiration, when the diaphragm descends, it pulls the lung down with it and increases the tension on the adhesion This is especially true, of course, if the base of the lung is attached to the diaphragm and the adhesions are at the apex When there exists a combination of all factors—adhesions, consolidated lung, and thick-walled cavities—time only will give an exact idea of the importance of the adhesions in the prevention of collapse

“There seems to be no unanimity of opinion as to just what course should be followed when adhesions exist Some very excellent physicians believe that almost all adhesions should be severed if possible, while others believe that suf-

ficient time should elapse to determine whether the adhesions will really defeat the purpose of the pneumothorax treatment. It does seem to me that insufficient data have been presented up to the present time on the ultimate fate of these patients under the various methods of procedure for one to state positively which is the best course to pursue; and, of course, it is only upon this ultimate fate that constructive conclusions can be drawn. It has been my experience that in the great majority of patients, string-like adhesions can be stretched sufficiently by a continuation of the pneumothorax treatment alone, to obtain the desired collapse.

"In many patients the addition of a **phrenicectomy** with the attendant rise of the diaphragm will cause enough relaxation of these adhesions to allow closure of the cavities and sufficient rest to the lung. This is especially true if the adhesions are at the apex and base of the lung. By this procedure many hanging cavities are converted into closed cavities with only a relaxed adhesion left which is exerting no tugging on the cavity and which shows no tendency to keep it open. The attempt to overcome adhesions by these methods without opening the pleural cavity should be called the **closed method**. After sufficient time has elapsed and the closed method has not been effectual, we must decide between opening the thorax and **severing the adhesions** or doing a **paravertebral thoracoplasty**."

The method used by O'Brien (*loc cit*) differs chiefly from what the surgeon would primarily consider as suggested by the word **thoracotomy**, in the size of the incisions that are made and their situation, which determine the possibility of the absolutely essential tight closure.

"An incision about 3 inches long is made through the skin and fascia, usually over the second rib anteriorly. The pectoral muscle fibers are separated and the rib exposed. Two or 3 cm of the rib are then removed subperiosteally. After complete hemostasis has been obtained, a small incision about $\frac{3}{4}$ or 1 inch long is made through the periosteum and pleura into the pleural cavity. Small Cameron lights are then inserted through the opening, which allows a perfect view of the interior of the thorax. If the Cameron lights are held behind the adhesions, one can usually see through them very clearly and determine if a pulmonary cavity extends out into the adhesions. Not infrequently blood vessels can also be readily identified. Two clamps are inserted through the opening and the adhesions are crushed as far as possible from the lung tissue. These should be placed far enough apart to permit cauterization between them. If the adhesions are not too thick, they may be crushed for 5 minutes and then severed with the cautery knife between the clamps. Before the forceps are removed, electrocoagulation is used on the stumps. If the adhesions are very thick and it seems safer to ligate, then this can be readily done with the aid of a long tonsil needle. The sutures are to be placed in the crushed areas. After all adhesions have been severed, the small opening in the pleural cavity is tightly closed with a fine needle and a No 0 catgut, to prevent air leaks. The pectoral fibers are then approximated and the skin closed."

Such a method deserves careful consideration, because, using procedures with which all surgeons are conversant, it does not demand schooling in the entirely new technic of work through tubular instruments with monocular vision. The emphasis, however, laid by O'Brien on the *avoidance of secondary hemorrhage* by this procedure hardly seems to have the weight with which he regards it when the report just quoted from Welles of Saranac Lake is considered, in which "no secondary hemorrhage occurred in the whole series, . . . though it is fair to assume that as many as 500 adhesions have been cut."

The question centers about the possibility of *accurate air-tight closure*, which enables the early reinstitution of pneumothorax therapy, and avoids the danger of secondary infections. Aseptic technic should be as easily maintained in one procedure as the other, and because of the adaptation of well-known procedures, the time element may be shorter by this method than by that of Jacobeus. O'Brien claims, "this operation consumes, as a rule, much less time than the Jacobeus method, and the comfort of the patient must be considered. Bethune has modified the Jacobeus operation by using a very large thoracoscope . . . and applying clips to the adhesions before separating them. . . if these clips do not later act as a foreign body, I should be inclined to use them in a modification of my technic. They could be applied through the small opening with accuracy and ease. I am not, however, as yet convinced that these clamps may not later cause trouble."

[The silver clips used by the brain surgeons, the silver filagree as originally suggested by Willard Bartlett in hernia, the silver chain as recommended by Babcock, and the silver wire ligatures and sutures as used by the surgical forefathers, are all well tolerated, so that, as such, objection cannot, I believe, be made on the score of foreign body alone. Should they be set in an area of frank tuberculous pathology, the result would hardly be different than if a ligature had been so set, or if simple cautery incision had been made, with exposure of the general peritoneal cavity to discharge from the tuberculous focus so exposed.—Ed.]

"It is rarely necessary to make a very large incision or use rib spreaders to enlarge the opening as some operators describe, and I believe that most of the failures ascribed to this type of open operation are due to the difficulties in obtaining perfect closure of the pleural cavity. Pneumothorax cannot then be properly continued and the lung re-

expands and space is lost. Two of my early failures were due to this difficulty of closure, which resulted in leakage of air, emphysema and, finally, opening of the wound. Since I have employed the technic just described, none of these difficulties has been encountered."

To reach the conclusion as to when such *adhesions must be divided*, or even as to when they *could be divided with benefit*, is a decision beset with difficulties and is perhaps at present swayed considerably by personal opinion and prejudice for or against pneumolysis. In the study of 250 patients in whom artificial pneumothorax as the only surgical therapy had been used sufficiently long to form conclusions on the end results, O'Brien (*loc cit*) "found that after a few months of treatment only 20 remained in whom the adhesions were of such a nature as to suggest the necessity of intrapleural pneumolysis. Out of this group of 20, it was later found that in 11 of the patients the cavities had closed completely without pneumolysis in about 8 months after the induction of the pneumothorax, and the sputum became negative and remained so after about 6 months. It also appeared that 2 others would close if positive pressures were used. Only 6 of the patients remained in whom adhesions remained that apparently needed to be severed."

"It appears that in most cases from 6 to 8 months of artificial pneumothorax treatment should be carried on before surgical interference is considered. The type of lesion and other factors should, of course, influence us in individual patients. In extensive soft lesions, especially in colored persons and others with little resistance, the maximum collapse of the lung as soon as possible is essential, and in this group it is probably

justifiable to resort to pneumolysis earlier, especially if there exists a hanging cavity”

With such wide difference in numbers of cases deemed suitable for pneumolysis by 2 very competent men, it is clearly seen that this work, promising as it has been in both groups, is in such a stage of development that the earliest possible collection of detailed histories should be obtained for critical analysis. The establishment of a clearing house, comparable to the Bone Sarcoma Registry, sponsored, it might be suggested, by the Journal of Thoracic Surgery, should prove of value for such ends.

Pleural Effusions—The handling of the frequent pleural effusions during the period of pneumothorax is given consideration on the basis of the influence bearing on the type of end-treatment necessitated and Dundee (*loc cit*) expresses his opinions thus. From the writer's observations, it is apparently not uncommon to allow moderate, or even large, amounts of fluid to remain in the pleural cavity for long periods, if there are no concurrent discomforts. It is thought that to follow this practice is to invite thoracoplasty, eventually, of a greater or lesser type. However, some of these cases, even if frequently aspirated, do come to thoracoplasty, because of the large amount of original lung destruction. There is a striking difference in the ability for reexpansion in collapsed lungs on fluid development at different periods in treatment. If the fluid forms in the first year, the pneumothorax worker often has a difficult task to prevent the formation of adhesions due to partial lung expansion. With frequent aspirations, the amount of fluid removed will often have to be replaced by a nearly equal amount of air in order to maintain the desired de-

gree of collapse. On the other hand, if the fluid develops during the third year of treatment, the elasticity of the lung is likely to be diminished on account of the formation of fibrous tissue present, and probably the lung itself will become hampered in its action by the formation of pleural thickening. There will not be the same tendency toward lung expansion, and one will be more likely to find the fluid causing a further collapse of the lung, with the result that, in order to maintain the desired collapse, the air replacements will have to be much smaller than the amounts of fluid removed. Thus, one can see that, with fluid development occurring in the first year of treatment, nonaspiration often tends to diminution of pleural space, whereas in the third year nonaspiration is more likely to produce further collapse of the lung and a greater pleural space. The sanatorium worker will probably encounter more of the former class and the city worker more of the latter. If acute hydrothorax develops in the home and the general condition of the patient is such that visits to the office are contraindicated, an immediate transfer should be ordered to an institution where the facilities for fluoroscopic control are available.

If fluid develops in a case of inner selective collapse of fairly long standing and with the major portion of the lung 80 per cent reexpanded, there is very grave danger that this portion will become much more collapsed unless frequent aspirations are made and appropriately smaller air replacements are given. Should the fluid then be allowed to remain in the pleural cavity for a prolonged period, a further degree of pleural thickening and pulmonary fibrosis is almost certain to ensue, and when the time comes for terminating the treat-

ment, it may be found that a thoracoplasty will have to be resorted to, in order to accomplish pleural space obliteration. Even if the degree of re-expansion before fluid formation is only 30 per cent the same procedure of performing frequent aspirations and giving smaller air replacements will often be instrumental in maintaining this degree of collapse, and thus it will save a considerable number of patients from one of the operations supplementary to a paravertebral thoracoplasty. It is well to remember that the replacement of chronic effusion by moderate to large amounts of oil often tends to produce similar pulmonary fibrosis in cases with various degrees of collapse, if the oil is allowed to remain in the pleural cavity for protracted periods. Oil should not be given in large enough quantities to disturb the desired degree of collapse.

Hemorrhage from Upper Respiratory Tract—I Frenkel (*Otolaryngol slavica* 3.450 (Oct) 1932) states that hemorrhage from the nose, nasopharynx, or larynx after therapeutic pneumothorax for pulmonary tuberculosis is rarely mentioned in the general medical or special rhinolaryngeal literature.

The hemorrhage probably comes from the small arteries in the upper respiratory mucosa. The blood-pressure in these vessels is raised by the compression of the lung caused by the pneumothorax and by the increased output of the right side of the heart, all of which leads to venous stasis and distention. Another factor may be the loss of blood-vessel elasticity from the constitutional weakness associated with tuberculosis. Most of the patients developing hemorrhage complain of coughing, irritation and tickling, and scratching in the larynx immediately after the establishment of the pneumothorax. Regional examina-

tion of the respiratory mucosa demonstrates little except congestion and distention of the blood-vessels and swelling of the lymph nodes.

REFILLS—Granted that pneumothorax therapy has been successful, the patient has resumed activity, meantime continuing refills over a prolonged period, a decision must ultimately be reached regarding time of cessation of refills and method of procedure associated with cessation.

As experience with such therapy has increased, the duration of time recommended for continuation of refills has been gradually extended. The authority most quoted on this phase of the question, Rist, "has found that very few relapses occur in patients satisfactorily treated for 4 years and then allowed to relapse" (*A Peters New England J Med* 207 208 (Aug 4) 1932). Another writer, J C Dundee (*Am Rev Tuberc* 25 469 (Apr) 1932), quotes Rist as having "come to the conclusion that complete reexpansion should not be allowed until the fifth year," and Bethune (*loc cit*) quotes Rist again as saying to those patients who complain of the length of time required for pneumothorax treatment, "Yes, it takes longer than it does to die of tuberculosis."

END-RESULTS—Dundee (*loc cit*) considers particularly the value that he has found in **phrenectomy** as an aid in the obliteration of the pneumothorax cavity on cessation of the refills, utilizing this measure to lessen the demand for expansion on the well and healed areas of the lung where there has been much fibrosis, pleural thickening and mediastinal fixation.

He considers in his article "only cases that have acquired this collapse (maintenance of cavitation collapse) and have been under the care of the city

physician long enough to bring up the question of ending the treatment"

"One is faced with the choice of 2 different periods for ending the treatment (1) when there is still a reasonable danger of reactivation occurring, later, if not immediately; (2) when this doubt has, apparently, been removed by prolonging the treatment. By following the first course, further thickening of the pleura, and further formation of pulmonary fibrosis probably will be stopped and the lung expand more readily. With the prolongation of the treatment there is a corresponding prolongation in the rate of expansion, because of further thickening and more pulmonary fibrosis. The writer believes that a patient ought to continue this manner of living (a normal life) during reexpansion, and by this test, reactivation, if it is going to occur, will be more readily detected before it is too late. The writer aims to make his minimum period of treatment at least 3 years after last positive sputum"

In his development of plans of procedure for reexpansion, Dundee considers that the pneumothorax patients may be divided into 5 main types, not sharply demarcated in all features, yet recognizable

TYPE I—The repeated x-ray examinations have shown little destruction of lung tissue, and minimal fibrosis and pleural thickening

Treatment—"When it is deemed advisable to attempt to bring the treatment to an end, the following routine is employed. The 80 per cent degree of expansion, 'inner selective collapse,' before refill is allowed to become 90 per cent, by lengthening the refill interval and decreasing the amount of air given. This 90 per cent expansion is then maintained for a period of 3 months by shortening the refill interval and giving smaller amounts of air. If the patient is free from symptoms during the 3-month period, the treatment is stopped. If at any time during the end-treatment of

Type I there should appear definite evidences that the lung is likely to have great difficulty in obliterating the pleural space, or if there develops a marked retraction of part of the mediastinum to the pneumothorax side, with resulting symptoms, the case passes from Type I into Type II or Type III

TYPE II—"A case is so designated when there have been one or several attacks of effusion that have caused thickening of the pleura and a fixed mediastinum, with the result that the lung cannot fill the pleural cavity on reexpansion. There is still present a collapse anywhere up to 35 per cent. Possibly there is chronic pleural effusion."

Treatment—"It is believed that heretofore this type has been left alone, except for aspirations when indicated, and refills of air at long intervals, if the high negative pressures in the pleural space have caused discomfort. It is probable that a small minority of these cases have been forced into Type V by moderate to large pleural effusions which have remained unaspirated over long periods, and thus some of them have finally terminated in thoracoplasty"

Two cases of this type were subjected by this author to phrenicectomy. In one, Case 2, x-ray examination after cessation of gas treatment showed that expansion was probably prevented by densely thickened visceral pleura, and later x-ray giving no evidence of further change apparently confirmed this. Phrenicectomy was done and the pneumothorax became obliterated. The eventual rise of the diaphragm was 5 times that noted between inspiration and expiration a short time before operation. The patient continued to be symptom-free and is leading a normal life

Case 3—Pneumothorax, April, 1927, for repeated hemoptysis, exudative inflammation through greater part of field, consolidation in the lower part of upper third, and cavitation. Only 1 positive sputum (on concentration) after September Sanatorium discharge, October, 1928, and work resumed shortly after. Had had hydrothorax aspirated on several occasions, but without disability accompanying the hydrothorax during last 2 years. Last refill, February, 1930. Very little expansion in 4 months and no change in exudate. Phrenic avulsion, June, 1930. The x-ray, October, 1931, shows the right chest contracted. No pleural space, the patient free from symptoms, and working

TYPE III—In this type there has been a moderate amount of original lung destruction. Pleural effusion either has not occurred during treatment, or, if it has occurred, it has not fixed the mediastinum. The mediastinum is very flexible. The lung cannot reexpand to the original size, and there still remains to be obliterated 35 per cent of pleural space, unless the mediastinum is retracted from the midline.

Treatment—It is believed, that, heretofore, in this type, the remaining pleural space has been allowed to become obliterated by stopping the treatment, and thus permitting the flexible mediastinum to be displaced toward the side of the pneumothorax. It has been a common observation that many of these cases then exhibit signs of disability and suffer from unpleasant symptoms often caused by mediastinal displacement, such as dyspnea on slight exertion, cough, pains in the chest, and tachycardia. The writer believes that if phrenic avulsion is performed on patients of this type at the end of pneumothorax treatment, the resulting diaphragmatic rise will help to reduce the size of the remaining pneumothorax, and will at least limit mediastinal displacement and prevent the frequently accompanying symptoms.

Case 4—Pneumothorax (R), April, 1928
Last positive sputum, June, 1928. Last refill, September, 1931. This patient had always complained of throat irritation and tightness in the right side of the chest when the refill interval was more than 28 days. Phrenic avulsion was performed 36 days after the last refill, and there was immediate disappearance of the above symptoms, which had been present for a few days. The patient returned to work 1 week after avulsion.

Case 5—Pneumothorax (R), June, 1928
Last positive sputum, December, 1928. Last refill, September, 1930. Slight fluid present. Patient always had a tight feeling over the lower half of right chest if the refill interval had been more than 30 days. Phrenic avulsion, October, 1931. Returned to work in 4 days.

The writer believes the most suitable time for the phrenic avulsion is some weeks after the last refill, when there is certainty of highly negative pressure. Elevation of the diaphragm will be

greater if the operation is done before there are visceral and diaphragmatic adhesions to the parietes.

The question of the relative values of early and late phrenic avulsion, with regard to the pneumothorax therapy, is given consideration and the opinion of the writer is expressed as follows: "The writer thinks that this step (phrenic avulsion soon after the induction of pneumothorax) is premature and apt to make more difficult the problem of lung expansion after pneumothorax treatment. Its advocates state that there is more stability of the mediastinum following the operation and that a further degree of collapse of the lung can then be obtained. It has been the experience of the writer that, when a flexible mediastinum prevents the desired degree of collapse, such a collapse can often be obtained by cauterization of adhesions or by the development of hydropneumothorax, which usually causes thickening of the pleura and stabilization of the mediastinum. These writers state that the diaphragm is often pushed downward by the pneumothorax. The development of a hydropneumothorax after the operation must also be considered, as it is more likely to depress the diaphragm further than does air. There is, therefore, little doubt that, by performing phrenic avulsion during pneumothorax treatment, there is more likelihood of there being a larger pneumothorax space to be obliterated at the end of the treatment. There is also considerable danger, in this downward position, of the diaphragm becoming somewhat fixed by adhesions, and not being able later to regain the height obtained when the operation takes place at the end of pneumothorax treatment."

TYPE IV—In this group there has been a large amount of original lung destruction. The

mediastinum has not become fixed during treatment and is at the end still very flexible with a completely collapsed and atelectatic lung. On stopping refills there is little expansion and marked deviation of the mediastinum to the pneumothorax side, with a marked respiratory sway of that structure.

Treatment—"The patient is faced with chronic invalidism if refills are stopped and adequate surgery is not employed." Thoracoplasty is advised, with phrenic avulsion as an additional aid. If this is not accepted, refills are continued or oleothorax substituted.

TYPE V—Lung completely collapsed and atelectatic. Frequent recurrent hydrothorax, but with fixed mediastinum. Sputum negative and patient "often well enough to work between the acute exacerbations of pleuritis."

Treatment—Thoracoplasty with phrenic avulsion done if possible between attacks of pleuritis. "If the lung is 70 per cent. collapsed, it is probable that a paravertebral thoracoplasty will be sufficient to obliterate the pleural space completely. However, if the lung is wholly collapsed, so that little or none of it can be seen roentgenographically projecting into the pleural space, more extensive surgery will be needed to accomplish pleural space obliteration. Archibald recently demonstrated the roentgenograms of a patient with a similar degree of collapse of the lung in whom he had been able to obtain pleural sac obliteration. He stated that in addition to the usual posterior operation, supplementary anterior and lateral thoracoplasties had to be performed. To this observer it seems obvious that in this type of case only the most accurate surgery can obtain the desired result. One can sympathize with a patient who elects to forego such extensive surgery and prefers to continue with the aid of pneumothorax and fluid replacement or oleothorax. The replacement of chronic fluid by oil is now a fairly common procedure, and its advocates state that it often stops the development of fluid, or at least keeps the amount to a minimum."

CONCLUSIONS—"In many cases the artificial pneumothorax treatment of pulmonary tuberculosis can be terminated more satisfactorily at home than at a sanatorium, because the re-expanding lung is best tested when the patient is in a normal environment and carrying on his normal work.

"The term 'inner selective collapse' is used to describe a collapse in which the normal

area of the lung is allowed to re-expand only 80 per cent. This method of collapse is recommended as preferable to selective collapse when the normal area of lung is allowed to expand completely.

"The practice of allowing moderate to large amounts of fluid to remain in the pleural cavity for prolonged periods is condemned, because such a procedure eventually tends to limit seriously the re-expansion of the lung, as it usually increases pleural thickening, pulmonary fibrosis, and atelectasis. The benefits gained by allowing moderate to large amounts of oil to remain for a long time in the pleural cavity must be carefully weighed, as here also there is danger of excessive formation of pulmonary fibrosis and atelectasis."

Oleothorax—Little has been written outside of continental literature on this subject until quite recently. R. W. Matson (*Am Rev Tuberc* 25 419 (Apr) 1932), in the opening of his comprehensive article, speaks of the sharp division of opinion among the French as to its value and says "Certain it is that oleothorax therapy requires far more technical skill, keener judgment in the selection of material, and far closer observation of cases than is required in artificial pneumothorax therapy."

Indications and Contraindications.—Matson lists the *indications* as follows: "Oleothorax is indicated in the course of pneumothorax therapy under the following conditions:

"*First*—As a *disinfection* oleothorax, for the treatment of pneumothorax empyema.

"*Second*—As an *inhibition* oleothorax (*oleothorax antisymphysaire*) to prevent expansion of the lung in cases in which a satisfactory collapse cannot be maintained by air inflations because of a threatened early obliterative pneumothorax.

"*Third*—As a *compression* oleothorax, to reestablish collapse in cases in

which air inflations have failed to maintain a proper collapse of the lung tissue

"Other *questionable indications*, or indications of lesser importance, are (1) the collapse of rigid wall cavities in which an intrapleural pneumolysis is impossible, (2) stiffening of a labile mediastinum, (3) caseous tuberculosis pleuritis, as a prophylactic measure against empyema, (4) febrile reactions to gas

"Absolute *contraindications* are (1) pleuropulmonary fistula with a large opening, (2) ordinary serofibrinous exudates complicating an artificial pneumothorax, (3) as a substitute for pneumothorax in patients who, for various reasons, are unable to undergo a prescribed course of pneumothorax therapy, (4) inability to maintain collapse on account of too rapid absorption of gas "

As an explanation of these sharp limitations of indications he makes the following comments

"While oleothorax therapy has been applied successfully in pleuropulmonary fistula with a small opening, its use in cases having a large opening is contraindicated, for the reason that the discomfort of the unfortunate patient would only be aggravated by the continuous expectoration of oil, which might prove suffocating or set up a dangerous aspiration infection

"Oleothorax therapy is not recommended for the treatment of serofibrinous exudates complicating an artificial pneumothorax because the pleura is likely to be irritable and respond with a purulent exudate-formation, which would only aggravate the situation

"It is not recommended for pneumothorax therapy in patients, who, for various reasons, are unable to undergo the prescribed course of pneumothorax

treatment, for the reason that oleothorax patients require much more careful observation and stricter regimen than is required in pneumothorax therapy Therefore, if a patient is not in a position to undergo a course of pneumothorax therapy, he is a poor candidate for oleothorax therapy because of the danger of oleothorax therapy

"It is not recommended as a substitute for pneumothorax therapy in patients in whom there is difficulty in maintaining a collapse on account of the too rapid absorption of air It is much better to shorten the air inflation interval than to subject the patient to the danger of a complication, which might lead to the early fixation of the lung to the chest wall

Gomenol—In discussing the oil bases employed, the opinion is expressed that the essential differences, particularly in absorption, of mineral and vegetable oils are factors to be considered in their use, and for ordinary use a mineral oil base is recommended because of its slower absorbability, while in empyemata, secondarily infected with pyogenic organisms, a vegetable oil base, because of its greater absorbability is believed to carry the added bactericidal oil gomenol to a greater depth in the tissues

Whether vegetable or paraffine oil are to be used, preparation is made by the addition of the gomenol to the extent of 5 to 10 per cent allowing the combination to stand for 3 weeks to secure thorough mixing of the oils and then sterilized by autoclaving at 30 pounds for 20 minutes or 20 pounds for 30 minutes

Gomenol, a volatile oil closely resembling oil of cajaput, obtained by distillation of the leaves of *Melaleuca viridiflora*, a member of the myrtle family growing in New Caledonia, has

been chosen for addition to the basic oil because of its demonstrated antiseptic and bactericidal properties in percentages not irritating. Experiments are quoted as showing lack of toxicity of gomenol when injected subcutaneously in dogs in amounts of 6 Gm ($1\frac{1}{2}$ drams) per kilo ($2\frac{1}{8}$ lbs). As a result of other experiments quoted, the conclusions have been reached that this oil will kill acid-fast organisms in from 5 minutes to 3 hours, and staphylococci in from 3 to 9 hours, and that a concentration of 4 to 5 per cent is sufficient in tuberculous empyemata, whereas the mixed-infection empyemata require 5 to 10 per cent. A further interesting finding is quoted: "Clerc used the toxin of the organisms of botulism, tetanus and diphtheria. He found that 10 times the fatal dose of botulinus toxin was completely neutralized by 5 c.c. gomenol."

As practical application of the experimental findings, it is recommended that "in the *inhibition* oleothorax and all cases in which a purulent exudate does not exist, either pure paraffine oil, or paraffine oil to which 1 per cent gomenol is added, is used. In *disinfection* oleothorax, paraffine oil to which 5 per cent gomenol has been added is recommended for the chronic pneumothorax empyemata. Paraffine oil, olive oil or Wesson oil, to which 10 per cent gomenol is added is recommended as a disinfectant for those virulent and toxic types of pneumothorax empyema that are usually complicated by the presence of a secondary infection.

Testing Sensitiveness of Pleura—As a *preliminary* to the free use of oil in the attempt to produce an oleothorax, the necessity to determine the sensitiveness of the pleura to the oil by the use of small preliminary injections has been found to be imperative. Because of de-

velopment of severe reactions at times when 10 to 20 c.c. test doses had been employed as recommended by the earlier proponents of the method, the following plan of preliminary testing was developed.

"As soon as it has been decided that air inflations are no longer efficient to maintain collapse of the diseased lung tissue for the desired length of time, we begin by injecting 1 or 2 c.c. of 1 per cent *gomenolized paraffine oil* through the inflation needle into the pneumothorax cavity, after which the patient receives his regular inflation. Reaction to this dose rarely occurs. At the next regular inflation period, 4 c.c. are injected and inflation is carried out as usual. Even though a constitutional reaction has been absent, a third test dose is not made until one is certain, either by fluoroscopic examination or exploratory puncture, that an exudate is not present. If an exudate is present, it should be aspirated and the inflation carried out as usual, but oil injections are withheld until all tendency to exudate-formation has completely subsided. If there has been no intrapleural or constitutional reaction to the second test dose, the third test dose, consisting of 8 c.c. of oil, is injected through the inflation needle and followed by the usual inflation. If no reaction occurs to the third test dose, we usually inject 15 to 20 c.c. of oil as a fourth test dose at the next regular inflation interval. In the absence of a reaction, the quantity of oil injected at each subsequent sitting is usually doubled, up to an injection of 200 c.c., after which the dose is increased 100 c.c. at each sitting, but one should never inject more than 500 c.c. at one time. A very similar plan is followed by Kuss. The conversion of a pneumothorax requiring more than 2000 c.c. of oil in a man, or 1000 to 1500 c.c. in a woman, is not recommended.

"If the regular gas intervals are more than a month apart, the test doses up to 20 c.c. can be made at intervals of a week or 10 days, but the patient should be confined to bed and carefully observed. Furthermore, one should always explore the pleural cavity to determine the presence or the absence of an exudate before making further injections, after the second or third test dose has been administered. If this rule is followed in every case, one will

be spared the embarrassment of suddenly finding that a purulent exudate has developed unrecognized.

"In making the exploratory puncture, the patient is placed recumbent in the dorsolateral position, the needle is then inserted into the most dependent portion of the pneumothorax cavity, after which the patient is seated upright and aspirated, using a 50-cc or 100-cc syringe. An exudate, if present, occupies the lower level and the oil, being of a lighter specific gravity, floats on top. The fluoroscopic examination gives little or no information concerning the presence or absence of an exudate in the presence of oil, for the reason that the eye is not sensitive enough to differentiate the oil from exudate strata on the screen. By means of a good radiograph, one is able to recognize a purulent exudate beneath the overlying oil because of the difference of density of the two shadows.

Reactions—"There is no way of ascertaining beforehand what the reaction of the pleura will be to the test injection. If the pleura proves to be extremely sensitive to the gomenolized oil, one might try paraffine oil, which is perhaps less likely to produce reactions and is equally efficient, except when the oil is to be used for disinfectant purposes, the only advantage of the gomenolized oil being that it is slightly antiseptic.

"It is generally believed that a recently inflamed pleura is more sensitive than one which has not been the site of an inflammatory process, but this is not in accordance with our experience. In one of our cases, in which the patient had a recent exudative pleuritis, we replaced 300 cc of air with 300 cc of 1 per cent gomenolized paraffine oil at the first sitting, and there was no reaction. On many occasions we have replaced 100 to 250 cc of air with paraffine, or gomenolized paraffine oil at the first sitting, without reaction.

"In many of our cases which were rapidly converted without reaction, there had been a recent exudative pleuritis,

and in other cases there was no evidence of a previous inflammatory process in the pleura. While it is our custom to occupy 2 to 3 months in the conversion of a pneumothorax into a complete oleothorax, we have also, with perfect ease and without reaction, converted other cases within a period of 1 or 2 months. In one of our cases 1950 cc of air were replaced with oil in 1 month. In another case, 1680 cc of air were replaced with oil in 2 months, both without complications or reactions.

"The reactions to oil injection are uncertain both as to frequency and degree of occurrence, necessitating constant watchfulness. The reactions may be of a rather severe systemic type, the patient describing the condition as 'being sick all over,' 'grippy,' etc., and of a local reaction varying from a serous to a purulent exudate. The local irritation is, however, not constant and though necessitating a temporary interruption of treatment, may not require absolute cessation. If at any time an exudate-formation occurs, it is better to aspirate the contents of the pneumothorax cavity and abandon the use of oil temporarily until exudate-formation has ceased.

In a few cases we were successful in converting a pneumothorax into an oleothorax only after 2 or 3 failures, and in 1 case we succeeded in establishing an oil blockade only after having failed 4 times. It is much better to take 2 or 3 months, or even 6 months, in the conversion of a pneumothorax into an oleothorax, rather than to face failure by a too rapid conversion."

The reactions occurring during the use of the test doses, or even later, are classed as "*intrapleural*," referring to the occurrence of *thoracic pain* and the development of *effusions* of greater or lesser density. The constitutional reac-

tions vary much in severity, time of appearance and duration. The appearance may be almost immediate or delayed for some days, the duration be for 2 or 3 days or as many weeks, and the temperature range from 100° F (37.8° C) to as high as 103° F (39.4° C). When the reaction is severe, *exudate-formation* usually occurs, though actual chest symptoms may be absent, and occasionally *gastrointestinal symptoms* may be the most conspicuous discomfort.

The incidence of reactions primarily reported has been high, especially when test doses of 10 to 20 c.c. were used. With the use of the smaller test doses as covered earlier in this abstract, the reactions have been reported as reduced by 75 per cent in frequency. [When it is realized that this therapy has been applied only in patients not responding well to longer established procedures, the incidence of such reactions should not be considered as a deterrent to the careful consideration of this type of therapy—Ed.]

INHIBITION OLEOTHORAX—Again, in order to permit of the most complete visualization of pathology and of successive steps employed in meeting situations as they arose, the whole resulting in a successful issue, one of the case reports is quoted in extenso and the x-ray studies included, where the procedure was employed on the basis of inhibition oleothorax, the purpose planned being the prevention of expansion of the lung where the collapse cannot be maintained for the required time because of the development of an early obliterative pneumothorax.

"Mrs. J. R. S.—Examination on June 6, 1924, revealed a fibrocaseous cavernous tuberculosis of the left lung with an active infiltration of the upper right lung. Temperature, 102.3° F (39° C). Sputum, 16 c.c. Tubercle bacilli positive.

Pneumothorax was started in June, 1924. A satisfactory collapse was obtained in spite of a lateral chest-wall adhesion that was thought not to be of technical importance. The patient improved steadily, the sputum became negative and the temperature normal. A pneumothorax pleuritis appeared in July, 1924, and subsided in September. In October, 1924, the patient developed a severe hemoptysis that was supposed to have its origin in the healthier lung. The temperature ranged from 101° to 103° F (38.3° to 39.4° C) for 9 days. Two weeks later, a fresh pleuritis appeared over the contralateral lung. This was followed by an exudate-formation which was treated by aspiration and air-replacement. The exudate disappeared completely within a short time. The small pneumothorax that was established on the right could not be maintained, as a result of which the lung expanded and attached itself to the chest wall.

In December, 1924, an exudate again appeared in the left pleural cavity. This was followed by an average daily temperature of 101° F (38.3° C) for 5 days. This complication was treated by aspiration and air-replacement. In March, 1925, the exudate became purulent. A radiograph taken in April, 1925, showed considerable thickening of the lateral chest wall adhesion, with a marked tendency of the lung to expand at the root. Treatment by means of aspiration and irrigation brought about relief from this exudate-formation. In October, 1925, the exudate had disappeared completely. Coincident with this exudate-formation, the tendency to an obliterative pneumothorax became marked. The intrapleural pressures began to rise steadily. A radiograph taken in December, 1925, showed the lung half expanded with still more marked thickening of the lateral chest wall adhesion. The patient's general condition was good, with sputum negative and temperature normal, and it was felt that, in spite of the rising intrapleural pressure, a collapse could be maintained for a sufficient length of time to secure recovery.

In December, 1926, the patient developed a pneumothorax pleuritis for the third time. This exudate disappeared in October, 1927, following which the intrapulmonary pressures began to rise still more rapidly, so that 100 c.c. of air at biweekly intervals left her with a pressure of +6, +9. It was apparent at this time that her pneumothorax could not be

maintained long enough to insure recovery, and it was decided to convert the pneumothorax into an *oleothorax*. A complete blockade of the pleural cavity was established without reaction or complication, and has been maintained since that time, now a period of over 4 years.

During the year 1928, the patient received 500 c.c. of 1 per cent gomenolized oil, during 1929, she received 270 c.c. of oil, and during 1930, 170 c.c. oil were injected. During 1931 there were no oil replacements.

Technic—In the technic of injection, the following may be offered as a summary of the precautions and procedures to be employed.

“1 The tolerance of the pleural cavity for the oil is determined as before outlined.

2 Oil is injected slowly, having been previously heated so that it is delivered within the pleural cavity at body temperature, in order to avoid reactions which cold or hot oil may provoke. The patient during this stage of conversion lies during the injections on the good side.

3 The oil is introduced, when large amounts are to be given, in units of 20 c.c. by the use of a 100-c.c. syringe, with the alternate introduction of oil and aspiration of air, to avoid rapid increase in intrapleural pressure and also the possible pressure perforation into the lumen through some superficial area of softening.

4 After the injection of the amount of oil that has been estimated as sufficient at that particular stage of the conversion, the amount of air necessary to reestablish the desired pleural pressure is injected.

5 After many sittings of this sort, or when the oleothorax has been nearly completed, a fluoroscopic or radiosopic examination of the patient in the erect position will show a small bubble of air at the top of the pneumothorax cavity. At the next sitting the bubble is easily aspirated and replaced with an equal quantity of oil. The oleothorax is thus complete.”

OIL REPLACEMENT—The frequency of oil replacement, after the oleothorax has been established, depends on the type of oil that has been used and the conditions for which the oleothorax was established. Where vegetable oils have

been used, as great an absorption as 900 c.c. in a month has been reported. “This, of course, is a distinct advantage when dealing with a mixed infection empyema, inasmuch as one secures a penetrating action of the gomenol, whereas, if gomenolized paraffine oil is used, the action is largely local.” In the early months of the blockade, mineral oil in 100-c.c. amounts per month may be required, later the rate of pleural absorption decreases, explainable on the basis of pleural thickening, and the amounts required may be as small as 20 to 40 c.c. at intervals of several months.

Before replacement, satisfactory estimate of intrapleural pressure may be made by observation of the behavior of the oil when the needle is inserted with the stop-cock open. Escape of oil indicates positive pressure, a stationary oil surface is seen when a neutral pressure exists, and a nonappearance of oil with air-aspiration indicates a negative pressure. At the same time, absence of exudate must be assured by having inserted the needle used with stop-cock closed (a 13 gauge is recommended) into the lowermost part of the oleothorax cavity while the patient is in the dorsolateral position. It is of course obvious that gravity, when the patient assumes the sitting posture, determines the settling of any exudate to the lowermost part and aspiration reveals its presence. If present, the exudate is aspirated and replacement is postponed, if no exudate is found, the patient is returned to the dorsolateral position and the injection made with the usual precautions.

COMPRESSION OLEOTHORAX—*Indications*—This type of collapse is used in

“A Reestablishing collapse in a lung which has partially expanded as a result of a progressive symphysis of the pleura, a chronic productive pleuritis, or

traction of a thickened lateral chest wall adhesion

"B Collapsing rigid-wall cavities that cannot be closed by means of gas pressure, or cavities which are held in an expanded condition because of the presence of adhesions which cannot be severed by means of intrapleural pneumolysis "

Technic —The general technic of oil introduction is the same as for the inhibition pneumothorax, but because of necessity, high pressures will be employed, the patient must be prepared for the condition by a gradual elevation of pleural pressure to the required levels by air inflation. These precautions are observed in order to lessen the chances of producing a perforation of the lung.

Escape of oil, when used under pressure, by way of the needle tract from the pleural cavity into the cellular tissues, thus producing a paraffinoma, is avoided by oblique insertion of the needle and by covering the site of puncture with rubber sponge tightly strapped down by adhesive.

Attempts to obtain the benefits of a compression oleothorax may be frustrated by the existence of a labile mediastinum which under pressure yields to the contralateral side and reduces the desired pressure on the cavity walls. Matson (*loc cit*) believes that increased mediastinal rigidity may be secured by relatively frequent injection of gomenolized oil in 5 c c amounts. Precaution is taken to secure the local action of the oil by making the injection in the third or fourth interspace in the anterior axillary line, with the patient so placed, semiprone recumbent, that the oil, when introduced just within the pleural cavity, flows down to the mediastinum over the anterior chest wall. Maintenance of this position for an hour increases the local

effect. When, as evidenced by a reduction in the bulging of the mediastinum, the desired effect has been accomplished, the production of the oil compression may be started or more radical work done if indicated.

ELECTIVE OLEOTHORAX —Technic —This would correspond to the selective pneumothorax, where the oleothorax lies only over the diseased area of the lung, the uninvolved lung having been allowed to expand and develop parietal pleural attachments. In some cases, particularly bilateral disease, it will be found desirable to effect a collapse of the diseased lung tissue only. In these cases the healthy lung tissue is permitted to expand and attach itself to the chest wall, after which an oil blockade of the pneumothorax cavity is effected. If the pleura over the healthy lung tissue possesses little tendency to become adherent, adhesion of the two pleural sheaths can be effected by the injection of small doses of oil, sufficient to irritate the pleura, which will be followed by adhesion formation, after which an oil blockade is established, using 1 per cent gomenolized paraffine oil or pure paraffine oil.

Indications —The treatment of *tuberculous empyemata* by this therapeutic procedure is strongly advised by Matson (*loc. cit*), the details of procedure being sharply divided by the classification of empyemata into nontoxic, or tolerable, and toxic, or virulent.

The rationale for the employment of gomenol and oil is based on experimental and clinical observations which have established the fact as previously noted that gomenol is definitely antiseptic and bactericidal for the tubercle bacillus, and that where used in solution with a vegetable oil, absorption permits the continuance of this antiseptic action to a

depth beneath the surface. Other benefits are believed to accrue from the collection of polymorphonuclear leukocytes, as a result of the chemical inflammatory reaction set up, with their subsequent disintegration and "liberation of proteolytic ferments which liquefy the products of caseation, thus permitting a cleansing of the pleural wall." Further benefit is attributed to the appearance of lipolytic ferments, whose presence is indicated by a characteristic opaque appearance of oil when later removed, the result of saponification by the lipases. Benefit from the lipase is believed to come by way of the action on the waxy capsule of the tubercle bacillus, with liberation of intracellular tubercle antigen and consequent immunity stimulation, and also by the liberation of the gomenol which "probably allows a massive antiseptic action, which is more efficient on the pleura, causing also a more intense local irritation and bringing with it a greater proteolytic action."

In the *nontoxic* cases the technic is only one of aspiration and replacement with an equal volume of 10 per cent. gomenolized olive or Wesson oil. This is done in units of 100 c c in order that intrapleural pressures are not greatly disturbed. As a precaution against needle track infection, the injection of a few drops of tincture of iodine during withdrawal of the needle is advised.

The chief difference in treatment of the *toxic* cases lies in the employment of saline irrigation. This is used in really enormous amounts "as high as 10,000 c c of irrigation solution being required," the patient being changed from the upright to the recumbent position for saline refilling after the primary aspiration, and then back to the recumbent position for secondary aspiration.

"This method of irrigation is continued until the return flow is clear." After this thorough irrigation, the disinfecting oil is injected into the pleural sac in amount equal to the exudate originally removed. Such treatment of irrigation and injection may have to be applied every 2 to 3 days in the beginning, with lengthening of the intervals as temperature subsides, and cessation of the irrigation element when the temperature remains normal. That patience and persistence are necessary, and may have their reward, is indicated by the recording that in one of our cases we were obliged to aspirate and irrigate in the above described manner 53 times during the course of 8 months, but the end-result was satisfactory inasmuch as we succeeded in ridding our patient of a virulent empyema associated with intermittent pleuropulmonary fistula.

Along these same general principles oleothorax is advised as an efficient measure in cases of *tuberculosis of the cortical areas of the lung with exudative pleuritis*, and in combination with thoracoplasty, and phrenic neurectomy, where pneumothorax cannot be effectively continued, as where basal empyema exists in the presence of dense apical adhesions and complete thoracoplasty would be the only other solution to the problem.

The end-results have to do with a series of 100 cases subjected to oleothorax treatment over a 5-year period, prior to January, 1930.

DISINFECTION OLEOTHORAX—Alone or combined with an inhibition or compression oleothorax. Of 50 cases, in 60 per cent the empyema was cleared up and the collapse maintained either by air inflations or oil blockade. In 40 per cent, or 20 cases, the results were unsatisfactory. Causes of failure are



Fig 5 —Position of patient in replacing air with oil
Fig 6 —Illustrating method of aspirating pleural cavity
Fig 7 —Illustrating method of irrigating the pleural cavity
(R W Matson Am Rev Tuber)

listed as pleurocutaneous fistula, 4 cases, pleuropulmonary fistula, 4 cases, failure of disinfection, 8 cases, reformation of purulent exudate, necessitating abandonment of treatment, 4 cases

INHIBITION AND COMPRESSION OLEOTHORAX—Of the 50 cases observed, satisfactory results were obtained in 25 cases, and unsatisfactory results in 25 cases. The treatment was temporarily abandoned but successfully reestablished in 15 cases and permanently abandoned in 25 cases. The abandonment of treatment in the above cases was necessitated in 20 cases because of persistent exudate formation. In 5 cases, the treatment was abandoned by severe constitutional reactions.

SUMMARY OF OLEOTHORAX THERAPY—Matson (*loc cit*), on the basis of his experience, summarizes as follows

Oleothorax therapy, although closely related to pneumothorax therapy, is a comparatively recent method of treatment and, therefore, lacks the test of time, which alone will enable one to estimate its ultimate value.

Oleothorax therapy requires far more technical skill, keener judgment in the selection of material and much more careful observation of cases, than is required in pneumothorax therapy.

Oleothorax therapy is *indicated* in the course of pneumothorax therapy under the following conditions: (1) as a disinfection oleothorax, (2) to inhibit the expansion of the lung in a threatened early obliterative pneumothorax, and (3) as a compression oleothorax to reestablish collapse or for the purpose of collapsing rigid-wall cavities in which an intrapleural pneumolysis is impossible.

Two types of oil are used, mineral and vegetable, to which gomenol is added in the strength of 1 to 10 per cent. Mineral oil is less absorbable and less irritating than a vegetable oil. A mineral oil is recommended in order to inhibit expansion of the lung or for compression purposes. A vegetable oil is preferable in the toxic, mixed-infection empyemata, because its rapidity of absorption

permits a penetrating action of the gomenol. It also possesses great nutritive value.

Gomenol, in a strength of 5 per cent, is capable of killing the tubercle bacillus, and is, therefore, recommended in the tuberculous empyemata. In the mixed-infection empyemata gomenol should be used in a strength of 10 per cent, since weaker solutions are not able to destroy mixed-infection microorganisms.

The *fundamental principles* of a *disinfection oleothorax* are (1) complete evacuation of the pus, (2) thorough cleansing of the pleural cavity, and (3) a disinfection oil bath of the entire serosa.

Oleothorax is not justified in the treatment of an ordinary pneumothorax empyema unless it tends to toxicity and chronicity.

Any substance, even air, when introduced into the pleural cavity, is likely to act as an irritant, to which the pleura responds with exudate-formation.

For the above-mentioned reason, oleothorax therapy is not intended to supplant pneumothorax therapy, and it should be employed only when it is evident that a pneumothorax cannot serve its purpose.

Oleothorax therapy is not recommended for the treatment of the ordinary serofibrinous exudates, which are well tolerated, for the reason that the oil may produce an inflammatory reaction, thus reawakening the exudative activities of the pleura.

In the absence of a purulent exudate, an oil blockade of the pleural cavity should never be attempted without the sensitiveness of the pleural cavity to oil having first been tested.

In converting a pneumothorax into an oleothorax, care should be used not to disturb the intrapleural pressure. This is accomplished by injecting the desired quantity of oil and the aspiration of air in units of 20 c c.

Before establishing a compression oleothorax the pleura should be prepared for higher oil pressure by preceding increased high pressure.

There is grave danger of lung perforation when a compression oleothorax is maintained under high pressure.

Pleuropulmonary perforations are almost invariably due to progressive lesions in the lung cortex or pleura which ulcerate into the pleural cavity.

The apparent increased incidence of pleuropulmonary perforation in patients undergoing

oleothorax therapy is due to the fact that more cases are revealed by the oil

The presence of an unaccountable gradual elevation of temperature demands exploration of the oleothorax cavity

Other contributions have been made that are largely in substantiation of the extensive and exhaustive article previously quoted. The statement is frequently encountered that the indications for oleothorax are limited, though some writers admit indications that are rejected by others

Phrenic Exeresis, Phrenicectomy, Phrenic Avulsion, Etc—F B Trudeau (J A M A 98 309 (Jan 23) 1932) says "It is a great boon to the physician working in pulmonary tuberculosis to have something to offer the patient and his friends when the results of rest and hygiene appear to be unsatisfactory, and if the advantages of this simple operation were generally appreciated, I feel sure it would be much more widely used" His contribution deals with the indications as seen by the physician specializing in tuberculosis rather than in details of surgical technic. Methods of temporary interruption have been abandoned by the group with which he is working, "we are all coming to the opinion that in any case demanding phrenicectomy, a permanent operation should be done at once rather than later, as resort to such an operation becomes necessary in the great majority of our cases in which the crushing operation is performed" O'Brien states "that this occurs in over 90 per cent of his cases in which the nerve has been crushed"

Although, even with extraction of 12 cm or more of the nerve, and the warranted assumption, therefore, that the connections of the accessory phrenics have also been severed, a failure of the diaphragm to ascend may be noted in

a fair percentage of cases because of adhesions, there is a value in the procedure because of elimination of the downward force of the inspiratory diaphragmatic pull. It is agreed, however, that the higher the diaphragmatic rise, the greater the benefits obtained. **Bed rest** for 2 weeks after operation is always advised though the postoperative course is afebrile

INDICATIONS—(1) Where pneumothorax has been unsuccessful because of adhesions. Chest capacity reduction is estimated at $\frac{1}{6}$ to $\frac{1}{3}$ or an equivalent of 400 to 800 cc, (2) where, after 6 months of "cure," conditions appear to have changed little. "In other words, his fate is still hanging in the balance" Often, in such cases, the immediate paralysis of the diaphragm on the affected side will weigh the scales in his favor and enable him to round the corner and gain a good start toward recovery, (3) presence of cavities. "Many persistent cavities have been seen to disappear on the roentgenogram following phrenic exeresis" E J. O'Brien (Tr Nat A Prevent Tuber, 1931), reports closure of 50.5 per cent cavities in 378 cases, and reduction in the size of the cavity in an additional 33 per cent and Matz is quoted as reporting cavity contractions in 27 per cent and Cooper in 38 per cent

RESULTS—Trudeau reports Welles as recording in his large series of cases. "approximately two-thirds improvement after operation, Powers 72 per cent; Bridge and Bly, 62 per cent, Matz, in which the operation was done in all stages, 48 per cent, O'Brien, 52 per cent of the positive sputum cases became negative"

The operative dangers and dangers of spread are estimated at about 2 per cent

TUBERCULOSIS, PULMONARY, IN CHILDREN.—ETIOLOGY.

The differences between so-called childhood tuberculosis and adult form are those of a primary infection and a reinfection, and are not based upon age differences. That the adult type of tuberculosis occurs in children is demonstrated by A. A. Karan (*Am Rev Tuberc* 26 571 (Nov) 1932). Of 538 children, 15 years of age or under, who were admitted to Wallum Lake Sanatorium during a 10-year period, 77, or about 14 per cent, had parenchymal tuberculosis, pulmonary infiltrations of the adult type. Twenty-five of them were 12 years of age or under, and 52 were 12 to 15 years of age, inclusive. In the entire group there were 53 females and 24 males, but it is significant that between the ages of 12 and 15 inclusive, there were 45 females and 14 males. These statistics are evidence of the danger of continued exposure to open tuberculosis and of the susceptibility of children, particularly girls, during the adolescent period.

R. M. Price (*Ibid*) 25 383 (Mar) 1932) reports that of 220 patients in the juvenile group suffering from some form of tuberculosis, 190 proved infected with the *human type* and 30 patients were infected with the *bovine type* of the tubercle bacillus. In the majority of instances in which the human type of the tubercle bacillus was isolated, there was a known history of contact with open pulmonary tuberculosis. Contact was usually close, the patient being exposed to tuberculous parents, grandparents, guardians, near relatives, and occasionally individuals sharing the home with the family. In some of the cases, 2 or more children in the family proved infected. Physical or x-ray ex-

amination, or both, showed evidence of tracheobronchial or pulmonary disease, the evidence pointing to the respiratory route of infection. In 30 cases in the series, the youngest, an infant 5 months, and the oldest, a girl of 12 years, the infection was caused by the bovine type of the tubercle bacillus. Without exception, the children harboring an infection with the bovine tubercle bacillus have come from parts in the province of Ontario where pasteurization of milk was not carried out. The history invariably revealed the fact that the child had been fed on raw milk. It was possible on a number of occasions to demonstrate virulent tubercle bacilli in the milk consumed by the child and in the cattle responsible for the transmission of the disease to the human host and thus bring forward the indubitable evidence of the source of the childhood infection. On the basis of these observations, the following conclusions were made: (1) bovine tuberculosis is an almost negligible factor in adult human infection. (2) The bovine tubercle bacillus is a factor of considerable importance in childhood tuberculosis. Thirteen and six-tenths per cent of non-pulmonary tuberculosis, leading to disablement, operation and necessitating prolonged and costly treatment, with doubtful results as to the outcome, is caused by the bovine tubercle bacillus. (3) The disease is milk-borne. (4) Bovine tuberculosis is preventable and can be controlled by the effective pasteurization of milk. The truth of this statement is forcibly brought out in the fact that in the city of Toronto, where pasteurization of milk is compulsory and has been rigidly enforced since 1915, not a single case of bovine infection has been encountered in the group of children brought up on the pas-

teurized milk of the district (1915 to 1930)

COMPLICATIONS —Bronchiectasis.—G Simon and W Blumenberg (J A M A 99 1210 (Oct 1) 1932) show that during childhood bronchiectasis may develop following tuberculous disorders of the lung. Persistent primary tuberculosis is most frequently the cause, it leads not only to the circumscribed forms located in the region of the primary focus or in the hilus but also occasionally to the extensive unilateral bronchiectasis with contraction of the lung. As a secondary disturbance after tuberculosis, bronchiectasis may develop as the result of cicatricial contraction of pleural adhesions and of bronchopulmonary lymph nodes. During childhood, bronchiectasis frequently concurs with minor tuberculous changes in the lungs.

Examination by the culture method and in animal experiments of sputum from children with bronchiectasis gave positive results in 74.5 per cent of the cases. Positive results are usually obtained in cases in which bronchiectatic and tuberculous processes concur, but in exceptional cases, also, when only bronchiectasis exists. The number of positive observations thus obtained represents a minimum that can be increased by repeated tests and by simultaneous examination of the gastric contents. An exclusion diagnosis based only on the stained specimen is not justified.

Erythema Nodosum—That erythema nodosum is in many instances associated with tuberculous infection is established. That it has an etiologic relationship is not universally accepted. Reports such as that of L B Dickey (Am Rev Tuberc 26 614 (Nov) 1932), in which all of his cases (16) were sensitive to tuberculin, makes it

seem likely that tuberculous infection may be responsible for many of these lesions. By many observers erythema nodosum is thought to be an early allergic manifestation of tuberculous infection. In support of this argument, they cite the frequency of markedly positive reactions to tuberculin, the frequent association of so-called perifocal pulmonary reactions or epituberculosis and the later development of other tuberculous lesions. Dickey's admonition that erythema nodosum occurring in children should be considered as evidence of early tuberculous infection or reinfection, unless there is definite proof to the contrary, seems justified.

What might be termed an epidemic of erythema nodosum is reported by A Landau (Arch Dis Childhood 7 77 (Apr) 1932). In a school class of 31 girls ranging from 11 to 12 years of age, 4 of them simultaneously had erythema nodosum. All but 2 of the 31 girls had a positive reaction to tuberculin. X-ray examinations of the chests revealed recent hilum gland enlargements in the 4 girls with erythema nodosum as well as in 4 others. Careful investigation of the entire class and the teachers resulted in the finding of a far-advanced pulmonary tuberculosis with cavitation and a positive sputum in 1 of the girls. She had had an acute "cold" with productive cough about 4 to 6 weeks prior to the outbreak of the erythema nodosum, but did not remain away from school. It seems likely that this girl was the source of infection and that the infection was at the time of the recent "cold."

DIAGNOSIS.—The determination of activity in hilum gland tuberculosis is a difficult task and at best is attended with some degree of uncertainty. Physical examination and the x-ray film

may not only not reveal any abnormality, but the interpretation of abnormal findings is by no means always consistent with the pathology present. For this reason it is quite logical to make use of whatever other data may be available, so that the handling of the individual child may be as intelligent as possible. Certain *blood findings* are supposed to indicate infective activity, some of these are attributed almost specific properties for tuberculosis. That this latter is not true seems quite likely; however, if activity can be determined and other infections essentially ruled out, then the evidence points to tuberculous activity. Because of this reasoning, the observations of E. Friedman, W. Dameshek and J. B. Hawes, 2d (Amer Rev Tuberc 25 24 (Jan) 1932) are reported here and not because they are at all conclusive. Blood examinations were made in 30 children with histories of tuberculous contact and with positive tuberculin reactions but who were not clinically sick. The sedimentation rate, white blood cell count, differential count by the Schilling method, and the monocyte lymphocyte ratio were determined before and after the subcutaneous injection of 0.10 mg of old tuberculin. It was felt that the tuberculin might, by intensifying the local lesion, have some effect upon the blood. An increased sedimentation rate, a leukocytosis of more than 12,000 per cmm of blood, more than 4 per cent of immature polymorphonuclear cells and an increased percentage of monocytes or a monocyte lymphocyte ratio of more than 0.33 were considered abnormal. A clinical study was made in conjunction with these observations. While the number of instances of abnormal blood findings was not great, it is interesting to note that there is a rather close agree-

ment with the result of the authors' clinical examinations.

Only 1 who had no abnormal clinical findings had a positive blood finding (questionable increase of the monocyte lymphocyte ratio after the injection of tuberculin) and there was only 1 who had positive physical findings who did not have some blood abnormality. The authors feel that the fairly close correlation of the clinical and hematological examinations would suggest that the abnormal blood findings were indicative of tuberculous activity rather than of an allergic manifestation produced by the tuberculin.

W. A. Reilly (*Ibid* 25 178 (Feb) 1932) has made a somewhat similar study of the *monocyte lymphocyte ratio* as an index of activity in a group of tuberculous children mainly with hilum gland infection. The ratio of monocytes to lymphocytes and the actual number of monocytes corroborated the clinical impression of activity in 62.5 per cent of the patients and the ratio of the two types of cells was in accord with the impression of inactivity in 92.3 per cent of the patients, although the actual number of cells was in agreement in only 62.5 per cent of instances.

Tuberculous Meningitis.—According to H. H. Lichtenberg (Am J Dis Child 43 32 (Jan) 1932), the *tryptophan test* is of value in determining the diagnosis of tuberculous meningitis. Of 78 spinal fluids which were examined all (25) that were proven by guinea-pig inoculation or necropsy to be tuberculous meningitis were positive. There were no positive reactions in the spinal fluids from patients who did not have tuberculous meningitis.

The test is performed by placing 2 or 3 cc of spinal fluid in an ordinary large test-tube (30 cc) and adding 15 to 18 c.c. of concen-

trated hydrochloric acid and 2 or 3 drops of 2 per cent formaldehyde. This is shaken and allowed to stand for 4 or 5 minutes. The solution is then layered with 1 or 2 cc of 0.06 per cent sodium nitrate and allowed to stand for 2 or 3 minutes. At the junction of the two liquids a delicate violet ring is formed if the reaction is positive, and a brown ring or no ring if it is negative. While the reaction is distinctly positive or negative in clear fluids, it may be confusing in purulent, hemorrhagic, and xanthochromic spinal fluids. The distinction is by means of the color reaction. In the above instance, the ring is a peculiar purple in contrast to the delicate violet color of the reaction in tuberculous spinal fluid.

Tuberculin—A statistical evaluation of the tuberculin test has been made in known tuberculous patients by P. D. Hart (Medical Research Council, Spec Rep Ser 164, Lond 1932, J. A. M. A 98 2212 (June 18) 1932). Intracutaneous tests were made in 1030 patients. Of these, 766 were tested with 0.1 cc of a 1:10,000 dilution (0.01 mg). Of this group 93, or 12 per cent, did not react. Each of the 1030 patients received 0.1 cc of a 1:1000 dilution (0.1 mg) and only 38 (3.7 per cent) failed to react. These 38 patients were then tested with 0.1 cc of a 1:100 dilution (1.0 mg). There was no reaction in 28 of this group and 23 of them were then injected with 0.1 cc of 1:10 tuberculin (10 mg). Of these, 4 reacted positively. The remaining 19 were given undiluted tuberculin 1:1 (10 mg) and only 1 gave a positive reaction. Thus, in this series 96.3 per cent reacted positively to 0.1 mg of tuberculin, 97.25 per cent to 1 mg; 97.7 per cent to 10 mg (1:10), and 97.2 per cent to 10 mg (1:1). The value of tuberculin in the detection of tuberculous infection is again demonstrated by this work and the importance of quantitative testing is confirmed. For practical purposes, the use of 0.1 mg of tuber-

culin in suspected cases and if there is no reaction, a second test with 1 mg, is sufficient to detect or rule out tuberculous infection. It must be borne in mind, however, that a positive tuberculin reaction gives no indication of activity of the infection and also that certain specific and nonspecific factors may influence the reaction. The 38 patients who had a negative reaction to 0.1 mg of tuberculin were found to fall into the following groups: (1) advanced pulmonary tuberculosis with toxemia, (2) bone or joint tuberculosis with activity; (3) a few nontoxic cases of active pulmonary tuberculosis with positive sputums and a few active cases of bone or joint tuberculosis with x-ray evidence of the disease for whose failure to react no reason could be advanced, and (4) a few cases either quiescent or approaching quiescence, all but 1 of which were also negative to undiluted tuberculin.

A new tuberculin has been developed, designated *M A 100*, which seems to have the advantages of old tuberculin without some of its disadvantages. E. S. Mariette and E. P. K. Fenger (Am Rev Tuberc 25:357 (Mar) 1932) give an account of the development of *M A 100* tuberculin and of the comparative studies with *O T* which have been made to determine its sensitivity and safety as a detector of tuberculous infection.

Old tuberculin is standardized on the basis of the minimal dose required to kill a tuberculous guinea-pig. However, it is now known that *O T* contains a polysaccharide which is as lethal for the tuberculous guinea-pig as is the protein of acid-fat bacilli, but it produces no reaction when injected into the skin of tuberculous animals. Thus standardization of tuberculin on the basis of the

minimal lethal dose does not give any information about its skin-testing potency. Old tuberculin has been shown to differ as much as 400 per cent in that respect.

M A 100 tuberculin is a protein extract of human, bovine and avian tubercle bacilli and the timothy hay bacillus. The protein is identical with the original tuberculo-protein isolated by Seibert. The bacilli are grown on Long's medium which are removed from the culture medium by filtration and the protein of the medium is precipitated at a given isoelectric point by glacial acetic acid. Thus, the identical substances are constantly obtained and these are not subjected to any denaturing process with heat or chemicals. The diluent is normal saline solution, so that there is no phenol or glycerine in the finished product.

The M A 100 proteins were standardized to give the same skin reaction as 0.01 mgm of O T. In comparative studies, M A 100 human protein has been shown to be as sensitive and as selective as O T and probably more so.

The following conclusions regarding M A 100 tuberculin are drawn by Mariette and Fenger. The initial and repeat (double) doses recommended for M A 100 human protein are safe in that dangerous reactions are not encountered and they are sufficiently large to detect the majority of tuberculous infections. There is apparently a protein substance common to all acid-fast bacilli, which, if given in large enough doses, will elicit the same type of reaction as that obtained from old tuberculin. Since the M A 100 protein represents a substance in a purified form which can always be reproduced at the same isoelectric point and which can be weighed out in milligram doses, so that the exact content

of the solution is known, it is a better testing substance than old tuberculin.

In order to prevent the deterioration of tuberculin dilutions, particularly the higher ones, the use of 50 per cent glycerine has been advocated. H S Willis (*Ibid* 25 67 (Jan) 1932) has shown that this is not a satisfactory medium, since such a strength of glycerine will itself produce a skin reaction which could be falsely interpreted as a positive tuberculin one. Intradermal skin tests were made with equal amounts of 50 per cent glycerine and salt solution and with equal amounts of glycerine and distilled water, respectively, in doses of 0.1 to 0.05 cc. There was an indurated reaction in all instances which appeared within 24 to 48 hours and in some instances persisted for 5 or 6 days. The reaction was remarkably uniform in size, appearance, and duration, being characterized by a firm, almost nodular induration with an average diameter of about 7 mm. It was pallid rather than red and in some instances paler than the surrounding skin. The reaction to the glycerine-water mixture was in most instances more intense and lasted longer than that of the glycerine-salt solution.

P Lereboullet and P Baize (*Arch de méd d enf* 34 701 (Dec) 1931) have observed that loss of sensitivity to tuberculin occurs most consistently in the course of measles but it is also observed in influenza, pertussis, typhoid fever, scarlet fever, German measles, chicken-pox, diphtheria and pneumonia. They would explain this phenomenon on a specific basis rather than on a non-specific one, as suggested by B Eddy and A G Mitchell (*Am J Dis Child* 40 771 (Oct) 1930). Lereboullet and Baize hold that the secondary infection affects the old tuberculous focus in such

a way that it is excited to renewed activity and the protective immunity to tuberculosis is lost

[Abstractor's Note At least 3 fallacies seem apparent in this argument (1) the correlation of immunity and allergy is far from established, (2) the allergic state is more quickly regained following these infections than it is established by a tuberculous infection, (3) the loss of allergy during the acute stage of these diseases seems to be more frequent than the evidence of tuberculous reactivity]

Bacterial—The danger of contact infection from cases of so-called closed tuberculosis is demonstrated by H Opitz (Rev méd German-ibero-am 5 16 (Jan) 1932), J A M A 98:1420 (Apr 16) 1932) Ordinary direct examination for tubercle bacilli is not sufficient and the author emphasizes the importance of cultural methods, preferably guinea-pig inoculation By this method he has demonstrated the presence of tubercle bacilli in the sputum or stomach washings of patients with perifocal pulmonary lesions, with tracheobronchial adenitis, with extrapulmonary tuberculosis when the lungs were apparently intact, and invariably in cases of tuberculous meningitis although no other military tuberculosis was present He concludes that most cases of so-called closed tuberculosis are actually open infections

The value of looking for tubercle bacilli on the direct smear and by culture and animal inoculation is emphasized by the work of C Kereszturi, N Mishulow, B Schick and D Behner (J A M A 98 1879 (May 28) 1932) They demonstrated tubercle bacilli in the stomach contents in 7 of 40 tuberculous children, whose average age was 5.9 years All of them were afebrile and gaining weight Tubercle bacilli were found in the sputum of 3 of the

children, all of whom were in the group with negative gastric findings Thus, it would seem that the *examination of the gastric contents* is a valuable adjunct to the means for the detection of open tuberculosis in infants and children, but does not supplant sputum examination

The literature on *Lowenstein's method* of blood culture for tubercle bacilli has been extensive in the past year It is interesting to note that many investigators are reporting successful results in the isolation of the tubercle bacillus from the blood by his method, while many others have been unsuccessful and question the value of this procedure Perhaps the most important contribution from Lowenstein, himself, in the past year is his report (C Reitter and E Lowenstein Wien klin Wchnschr 45 293 (Mar 4) 1932) of finding tubercle bacilli in the blood of patients with acute rheumatic fever (polyarthrititis) In 237 examinations on 82 patients, a tubercle bacillemia was found 87 times in 56 different patients Lowenstein concludes on the basis of these findings that acute rheumatism is an exudative, inflammatory phase of a reinfection with the tubercle bacillus

L v Dobszay (Monatschr f Kinderh 54 266 (Aug) 1932) has made 64 blood cultures by the *Lowenstein method* on 25 children 4 of whom had rheumatic manifestations Tubercle bacilli were isolated from the blood of 4 of these patients, all of whom had severe pulmonary or generalized tuberculosis No acid-fast bacilli were found in the blood of the rheumatic patients

A Wallgren (Arch f Kinderh. 95: 297 (Feb 5) 1932) cites the failure of Volk in Vienna, and Jensen in Copenhagen, to duplicate Lowenstein's findings of acid-fast bacilli in the blood of tuberculous patients Wallgren sent

specimens of blood from 14 children with erythema nodosum and from 4 with acute rheumatic arthritis to Lowenstein for culture. Tubercle bacilli were reported in the blood of 12 of the cases of erythema nodosum and in 2 of the 4 with polyarthritis. One of these patients with erythema nodosum and the 2 with polyarthritis had negative tuberculin reactions with repeated tests with doses up to 10 mg. Lowenstein suggests that this discrepancy between a positive tubercle bacillemia and a negative tuberculin reaction may be due to a loss of skin sensitivity during the period of sepsis. Wallgren answers this argument by saying that the negative tuberculin reactions were obtained during symptom-free periods in his cases, when the possibility of sepsis could not be considered. He concludes that a positive tubercle bacillemia and a negative tuberculin reaction in a child in good physical condition is not consistent with the present knowledge of tuberculosis and tuberculous allergy.

X-rays of Chest and Mantoux Test.—D J Dow and W E Lloyd (Brit M J 1 701 (Apr 16) 1932) emphasize the fact that a large number of intrathoracic infiltrations seen in children are nontuberculous. The distribution of the infiltration appears to be much the same in all children, whether they are infected with the tubercle bacillus or free of infection, a little over 50 per cent being in the lower zone, and the remaining 50 per cent equally distributed in the upper and middle zones of the lung. Upper zone infiltrations are more likely to be tuberculous than lower zone infiltrations. In view of the fact that 22 of 55 children who were considered to have x-ray evidence of calcified tracheobronchial lymph nodes did not react to tuberculin, it

would appear that the x-ray criteria in this respect were not sufficiently strict. In every case in which there is any doubt about the presence of calcified lymph nodes, an oblique x-ray picture should be taken, so as to exclude the possibility of mistaking a blood-vessel or other structure viewed "on end" as being a calcified nodule. It would appear that, in attempting to localize the lesion in children who are shown to be tuberculous by a positive *Mantoux reaction*, the chest x-ray is not so helpful as might have been supposed. The lesions, if in the lymph nodes, are invisible unless calcified, and the majority of such lesions may be extrathoracic. Further experience shows that nontuberculous infiltration and fibrosis are more common than tuberculous, from which they cannot be differentiated with certainty. Therefore, while the chest x-ray in children is of great clinical value, it has in this respect these definite limitations, and its interpretation in the "Mantoux-positive" child needs the greatest care.

C A Stewart (Am J Dis Child 43 803 (Apr) 1932) reports his conclusions based on a study of 4816 children, including 3981 (68.4 per cent) and 1835 (31.6 per cent) children having negative and positive *Pirquet tests*, respectively. In 1179 children, or 20.3 per cent of the entire group of 5816 persons, intrathoracic disease was revealed by x-ray examination. The prevailing type of lesion found in these 1179 children was that produced by the first infection by *Mycobacterium tuberculosis*, as shown by the fact that childhood tuberculosis was found in 82.3 per cent (970 instances) of these cases. For the 3981 children having a negative *Pirquet test*, intrathoracic disease was reported in only 6.4 per cent of the

cases (255 children), of which 39 per cent (154 cases) had lesions characteristic of the childhood type of tuberculosis. If questionable and slight intrathoracic glandular calcifications are excluded, the data show that the more conspicuous lesions characteristic of childhood primary tuberculosis were found in only 0.58 per cent (23 cases) of the children with a negative Pirquet test. For the 1835 children having a positive Pirquet test, intrathoracic disease was discovered by x-ray examination in 50.4 per cent (924 cases), and 44.5 per cent (816 children) had lesions of the childhood type of tuberculosis. When questionable and slight intrathoracic glandular calcifications are excluded, the more conspicuous and readily identified lesions typical of tuberculosis of first infection were found in 25.9 per cent (475 cases) of the 1835 children with a positive Pirquet test. If a value of 100 per cent is assigned to the Pirquet test as measuring its efficiency in the discovery of childhood tuberculosis, the x-ray examination has a reliable efficiency of about 25 per cent, and the physical examination an efficiency of a small fraction of 1 per cent.

From the standpoint of the appearance of lesions discovered by x-ray examination, childhood pulmonary tuberculosis of first infection may be divided into the following three types: (1) resolving pneumonic-appearing parenchymal consolidations, which represent early stages of the disease, (2) intrathoracic glandular calcifications of various degrees, which represent late permanent stages of the disease, and (3) Ghon tubercles associated with hilar gland calcification, which represent late and permanent stages of the disease. These various types of lesions merely represent various developmental stages

in the evolution of the diseases produced by a primary tuberculous infection, between which many transitional stages may be noted. The end-result in non-fatal cases is always the same in that calcification of the hilus gland appears, or that Ghon tubercles develop associated with calcification of the homolateral hilus lymph nodes.

Benign Tuberculous Infiltration.

—Three cases of benign tuberculous infiltration of the lung (*epituberculosis*) are reported by J. C. Spence (*Ibid.* 7. 1 (Feb.) 1932). The chief point of interest in these 3 cases is that, clinically, they resembled one another, the patients being tuberculous children, each with a massive lesion of the lung which was benign in character and lasted for a year or more, without much disturbance of the general health beyond some pallor and loss of weight in the early stages. In the first 2 the evidence that the lesion was tuberculous was only presumptive. In favor of this view are the facts that both had positive skin tuberculin reactions and one a history of contact with a tuberculous parent. Any other explanation of the nature of the consolidation is difficult. The children had not had pneumonia, and the complete disappearance of the lesion after it had been present for a year, and the recovery of the lung without signs of fibrosis or bronchiectasis, exclude bronchial obstruction as the cause. In the third case recorded, the child was infected at an early age, shortly after birth, so that the failure to gain weight in the first 6 months of his life had had a more evident effect on his general condition. Otherwise, the physical signs of the lesion and the progress resembled those in the first two cases. In the third case, the tuberculous nature of the process has been proved beyond doubt by recov-

ery of tubercle bacilli directly from the lung at 2 sites and on 2 occasions. The first exploration was made at a point which might conceivably have been the primary tuberculous focus, small in size and central in site. The second exploration was made at a point near the periphery of the consolidated area, as far as possible from the point of the first exploration. Tubercle bacilli were obtained in equal number and with equal facility from the two parts of the lesion. It is clear, therefore, that in this case the infant was infected shortly after birth with a large tuberculous lesion affecting almost the whole of the upper half of the lung, yet causing comparatively little disturbance to his health and no fever, and permitting a gain of weight.

The careful examination of material obtained in the syringe needle when exploring the chests in cases of this type is important. Of the cases described, the chief point of clinical importance is that they demonstrate that even an infant has a great power of recovery from tuberculous lesions of the lung.

PROGNOSIS.—That children can and do recover from tuberculous infection has been amply proven not only by the great number of children and adults who have positive tuberculin reactions without evidence of disease, but by observation of a growing list of patients who have actually recovered from pulmonary parenchymal tuberculosis. In line with this, C A Stewart (*Am Rev Tuberc* 26 597 (Nov) 1932) says that there probably is no known communicable disease of major importance and potentialities which on entering the human body for the first time so commonly proves to be as benign as does the first infection by the tubercle bacillus. He stresses the fact that the

greatest danger is that of reinfection, since the initial infection tends to prepare the child for the development of the "highly fatal adult type of tuberculosis."

PROPHYLAXIS.—The establishment of immunity to the tubercle bacilli after vaccination with B C G is still a questioned point. A Pittaluga and F Garcia (*Ann de l'Inst Pasteur* 43 1233, 1929, quoted by V B Dolgopol and R H Stitt *Am Rev Tuberc* 26 304 (Sept) 1932) observed the leukocyte reaction of 100 children who were vaccinated by the oral method. They reported (1) an early increase in the number of monocytes appearing on the fifth or sixth day after vaccination; (2) an increase of monocytes to 15 or 16 per cent of the total white cell count by the second to fourth week, and, finally, an increase in the number of lymphocytes and a decrease in the number of granulocytes. From these observations they concluded that the cellular reactions of the blood may serve as evidence of the immunizing process in the absence and before the tuberculin reaction makes its appearance. Dolgopol and Stitt (*Ibid*) have observed the relationship between the monocytic and lymphocytic counts in a group of 37 children who were vaccinated with B C G by the oral, subcutaneous and intracutaneous methods. Control observations were made on normal infants. Their findings were not in agreement with those of Pittaluga and Garcia. The fluctuations in the number of monocytes and lymphocytes in vaccinated children was not great and was within the normal range of variations in young children. They concluded that the slight increase in the number of monocytes, following vaccination with B C G, indicated low tuberculogenic properties.

of this bacillus and that the blood picture could not be used as an index of immunization following vaccination

In Denmark, comparatively few children have been vaccinated with B C G. For this reason C E Bloch (*Acta paediat* 13.40, 1932) thinks that his observation of a tuberculous cervical adenitis in a perorally vaccinated infant is significant. The author feels that since other sources of infection were practically eliminated, the B C G strain was most likely the infecting organism. This opinion was strengthened by the benign course of the infection, the inability to isolate tubercle bacilli from the discharge, or to inoculate guinea-pigs. The tuberculous nature of the lesion was confirmed by microscopic examination of the gland. Bloch recognizes the need for adequate tuberculous vaccination in children who must be in constant contact with tuberculous infection, but, as many others have done, calls attention to the uncertainty of the conferred immunity after peroral administration of the vaccine as well as to the possible dangers of producing low-grade chronic infections, particularly in the internal organs.

In view of this, he considers that the subcutaneous method is preferable in those cases in which vaccination is desirable, although even by this method there is danger of producing tuberculous ulcers and adenitis. The intracutaneous method, as employed by Wallgren, seems to obviate these difficulties, but the author questions whether there is an appreciable immunity conferred in this manner.

The advantages of the *parenteral* over the *enteral* administration of B C G are given by C Kereszturi, W H Park and B Schick (*Am J Dis Child* 43:273 (Feb) 1932) as follows.

- 1 It can be given to patients of any age, provided they are free from tuberculosis and give a negative tuberculin reaction

2. The control of the dosage is more exact

- 3 Those who believe that hypersensitiveness to tuberculin parallels immunity are more satisfied with the parenteral method because in 87 per cent of the cases the Mantoux reaction becomes positive, at least temporarily

Of the parenteral methods, the intradermal injection is to be preferred over the subcutaneous, because no cold abscess develops. However, hypersensitiveness to tuberculin occurs somewhat more frequently and lasts somewhat longer following the subcutaneous method.

C A Stewart (*loc cit.*) emphasizes the need of individual handling of the child with parenchymal pulmonary tuberculosis. Since there is nothing specific in the treatment, adequate general care can best be administered in a private home, either their own or a foster one, where there is no danger of reinfection. Group treatment in institutions subjects these children, through exposure to nontuberculous infections, to greater dangers than that of their tuberculous infections without affording any therapeutic advantage which cannot be obtained in any good home. He concludes, that the construction of institutions for the care of children having the childhood type of tuberculosis would be a waste of money as well as a backward step. He considers that public funds can be spent more advantageously in providing facilities which completely obviate the necessity of institutionalization of such cases.

TREATMENT.—G L Boyd and H. C Parsons (*Am J Dis Child* 44:

1007 (Nov.) 1932) have used **methylated antigen** in the treatment of more than 60 patients with external tuberculosis since 1926. On the basis of their observations, they advise its use in cases of *phlyctenular conjunctivitis* and in *bone, gland and skin tuberculosis*. Methylated antigen is prepared by extracting killed and dried tubercle bacilli with acetone, the acetone is removed by filtration and the defatted organisms are suspended in methyl alcohol for some days and then filtered. The filtrate is the so-called methylated antigen. Injec-

tions are made subcutaneously or intramuscularly once or twice a week. Boyd and Parsons followed the plan of Boquet and Negré, starting with 0.25 c.c. doses of dilute antigen. This dose was repeated once and thereafter each second dose was increased by 0.25 c.c. until 1 c.c. was given. The same plan was then followed using concentrated antigen. A course was considered to be complete when two 1 c.c. doses of concentrated antigen had been given. A full course of treatment thus required about 4 months.

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ULTRAVIOLET RAYS.— PHYSIOLOGIC ACTION

—A study of the effects of ultraviolet irradiation on a group of preschool children was carried on by H. E. Bull, G. H. Maughan and E. B. Waring (*Am J Dis Child* 43:1502 (June) 1932) in the Cornell Nursery School. This was attempted particularly to determine if irradiation would prove beneficial in lessening illness, particularly colds, in improving hemoglobin, in increasing gains in weight and height, or improving the child's general physical condition.

The children in the study ranged from 2 to 5 years. They came from superior homes, with good supervision of their diets, including daily fruit juices and cod-liver oil. In spite of these satisfactory conditions, it was found that many days for these children were spent in illness. The attendance rate never exceeded 83 per cent and about 50 per cent of the absences were the result of acute respiratory infections and some years were as high as 80 per cent. Following these "colds" there was a sharp loss of weight and appetite. In many

instances the average drop of hemoglobin during the winter was 14 per cent, but the red count showed no appreciable change.

For this study the children of the Nursery School were divided into 2 groups. Those who attended the afternoon session were chosen for irradiation and an equal number of the children present for the morning were used as controls. For irradiation a Sun Lamp was used. The lamps were so placed that the children were always within a 6-foot radius of the lights and could continue to play. The children were entirely undressed save for exposure of the genitalia. The temperature of the room was maintained at 70° F (21.1° C). The duration of exposure to the lamp was started at 10 minutes and gradually worked up to 45 minutes. Each child was given a complete physical examination preceding and following the period of study, with special attention being paid to the posture, muscle tone, color of the mucous membranes, cavities in the teeth and palpable glands. Hemoglobin estimates and red counts were

taken and the height and weight recorded. Records of attendance were kept with specific reasons for any absences.

During the first year there were 8 children who received the entire series of irradiation treatments. The second year there were 7. An equal number was found in each year in the control groups.

As for attendance, the first year the group with irradiation had the better record and during the second year the reverse was the case. Colds were recorded both by the numbers of days of absence and the average number of colds for each child. The first year, the irradiated group had a better record for colds both in absences and in number. In the second year there was a repetition of these findings.

The hemoglobin readings in the irradiated groups rose, but not as much as that in the controls. The red count was somewhat better for the irradiated group. During the second year, all groups showed a fall in hemoglobin and red cell count, but the irradiated group had a more favorable showing than either of the control groups.

Very little if any increase in weight and height was obtained from the records of the irradiated group. Physical examination revealed the muscle tone to be about the same in the groups but there was a decided improvement in the posture of the irradiated group. All of the children had good teeth, so it was impossible to draw any conclusions regarding the incidence of dental caries. Where lymphadenopathy was detected before the irradiation, it was found to have disappeared afterward.

R. Serderhelm (Klin Wchnschr 11:628 (Apr 9) 1932) states that the blood of humans and other mammals contains

an antianemic substance associated with the stroma of the erythrocytes which can be activated by ultraviolet irradiation. This statement is based upon the experimental work on dogs in which direct ultraviolet irradiation was given to the circulating blood of healthy and diseased animals.

Experiments showed that saponin-induced anemia in dogs is prevented by irradiation of the circulating blood. The transfer of this irradiated blood, accomplished either *in vivo* or *in vitro*, counteracted experimental saponin-induced anemia. This antianemic effect is not the result of a detoxification of the infused saponin, but is the result of an outpouring of young erythrocytes from the bone marrow into the blood stream in great abundance and to a degree not previously observed. The antianemic substance is associated with the stroma of the erythrocytes and can be derived from it in a protein-free, water-clear solution. The author has named the active substance "cytagenin." A small amount of this substance seems to be present in the blood of normal individuals, but it is in the preliminary form. Clinical investigations showed that the injection of cytagenin resulted in an increase in the reticulocytes in the peripheral blood of humans and other mammals. A large dose was required to bring about an erythrocyte and reticulocyte response in cases of carcinoma, chronic septic conditions, advanced tuberculosis and pernicious anemia.

INDICATIONS.—Broadly speaking, the indications for ultraviolet therapy in nose and throat work are for infections, according to F. L. Wahrer (Arch Phys Therapy 8:542 (Sept) 1932). The diplococcus and the tubercle bacillus are the most susceptible organisms to ultraviolet light.

The specific action of ultraviolet light is (1) bactericidal, (2) it breaks down toxins, (3) it increases the red cells and hemoglobin, (4) it reduces the white cell count, (5) it relieves congestion; (6) it hastens elimination of waste products, and (7) it stimulates metabolism

Chronic rhinitis and hyperesthetic rhinitis are markedly benefited by ultraviolet therapy. In the latter condition, the *light therapy* should be combined with the administration of *calcium* and *thyroid*. Chronic rhinitis, which often accompanies a low grade ethmoid infection, is greatly relieved by the *water-cooled ultraviolet*. The mucous membrane is stimulated and engorgement of the tissue is reduced and secretion reduced.

The nasal mucous membrane is much more tolerant to ultraviolet therapy than the throat. In the former, after tolerance has been established, the treatments may be given for 20 to 30 minutes, while on the throat irradiation must be confined to 30 seconds to 2 minutes.

Ozena has shown marked improvement with *ultraviolet therapy* and the use of the *high frequency glass electrode spark*. After cleansing all the mucous membrane of the crusts and exudate, the high frequency effluve is used on the mucous membranes. Following this, ultraviolet irradiation is given. After a few treatments the membranes will tolerate an exposure of 20 to 30 minutes. Although the author has never seen a permanent cure, he believes that many of these cases may be kept comfortable by this procedure.

Vincent's angina, one of the most stubborn conditions to treatment, has in ultraviolet therapy almost a specific, in the opinion of Wahrer. Thirty seconds exposures are given but he always fol-

lows this with some other form of medication.

Acute tonsillitis and subacute and chronic pharyngitis are also amenable to ultraviolet therapy, according to the author. **Tuberculous ulcers of the pharynx and larynx** have responded readily to the use of ultraviolet therapy, as the tubercle bacillus is easily killed by this method. Exposures of from 1 to 2 minutes are used. It is very important to rule out the possibility of malignancy when testing such cases, as a mistaken diagnosis will lead to a stimulation of the cells of the neoplastic growth.

Diphtheria carriers may be sterilized by the use of this light therapy. Donnelly reports 100 per cent success in rendering diphtheria carriers free from infection.

URETER.—TUMORS.—Tumors of the ureter are rather difficult to diagnose and seldom are they primary. During the last year, M. M. Melicow and H. V. Findlay (Surg. Gynec. and Obst. 54:680 (Apr.) 1932) report a benign tumor of the ureter which was discovered because of a calculus in the lower part of the ureter which had caused a pyonephrosis. Upon removal of the specimen, a *polyp* was found at the ureteropelvic junction. This had not been even suspected in the uroselectan pictures.

A solitary *papilloma* of the lower right ureter was found at autopsy by H. A. Fowler (J. Urol. 27:561 (May) 1932). He analyzed 13 additional collected cases. Hematuria was the presenting symptom in 8, in 6, this was symptomless, and in 1, it was associated with renal colic. From an analysis of the published cases he described the following as the diagnostic criteria of greatest value: (1) obstruction in the

ureter, (2) increasing hemorrhage on catheter manipulation, (3) clear urine from above the obstruction if the catheter passes it, and (4) filling defects in the ureterogram

ANOMALIES.—The anomalies of the ureter are so intimately linked with those of the kidney that little need be said about them, as their diagnosis and

Complete *bilateral duplication* of the ureters occurred in a case seen by Williams (*Ibid* 28 279 (Sept) 1932) and Levy and Melville (*Brit J Urol* 4 241 (Sept) 1932) observed a case of *bilateral complete duplication* of the renal pelves and ureters in a child

OBSTRUCTIONS.—Ureteral obstructions have caused a great deal of

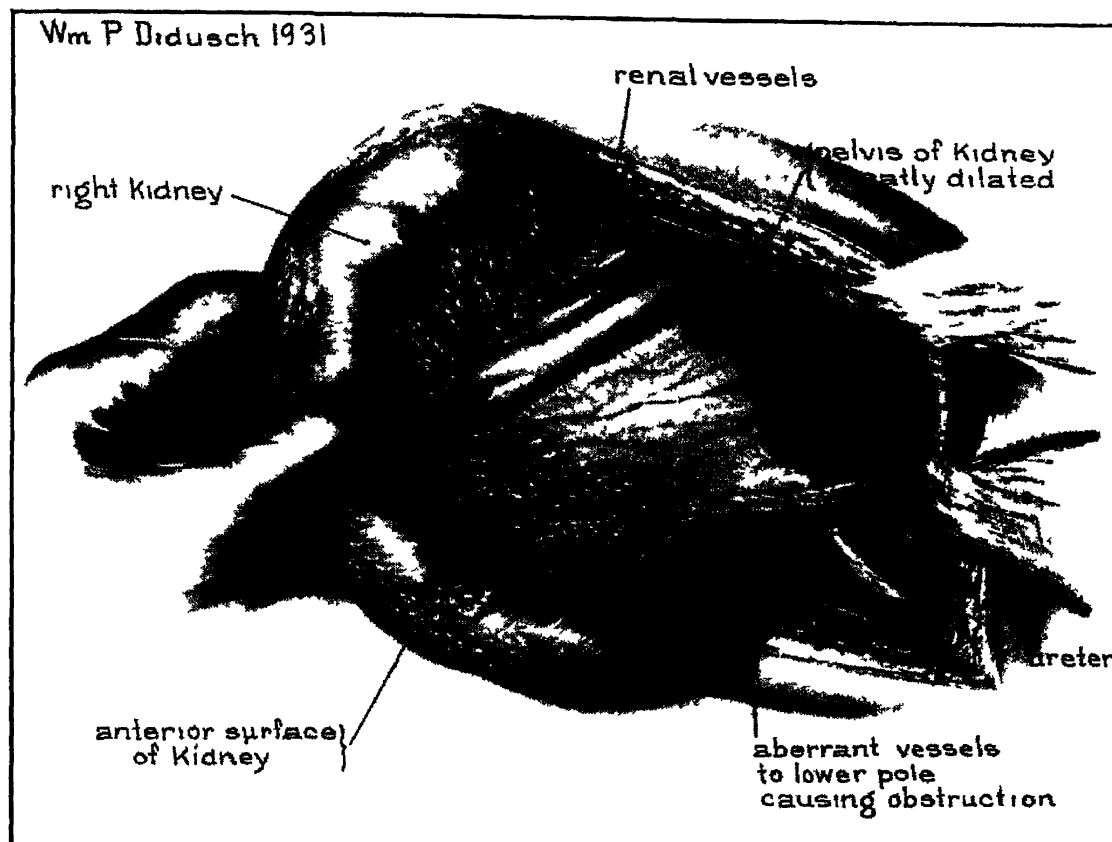


Fig 1—Anterior surface of right kidney delivered through wound, showing aberrant vessels at lower pole, which caused pressure, kinking, and obstruction to ureter just below junction with pelvis, which is greatly dilated (Young Surg Gynec Obst)

treatment is almost always intimately linked with that of the renal condition accompanying them

A E Cerf (*Urol and Cutan Rev* 36 619 (Sept) 1932) reports a case of *partial duplication* of the left ureter with anastomosis at the fifth lumbar vertebra, while G A Winfield and C C Higgins (*J Urol* 28 53 (July) 1932) observed a case of *single ectopic ureter*

study and discussion during the past few years and very often are being diagnosed before marked changes have taken place in the kidney

H H Young (*Surg Gynec and Obst* 54 26 (Jan) 1932) describes a very unique technic for the relief of massive *hydronephrosis* caused by an aberrant vessel at the ureteropelvic junction. By a plastic operation upon the pelvis so designed as to draw the

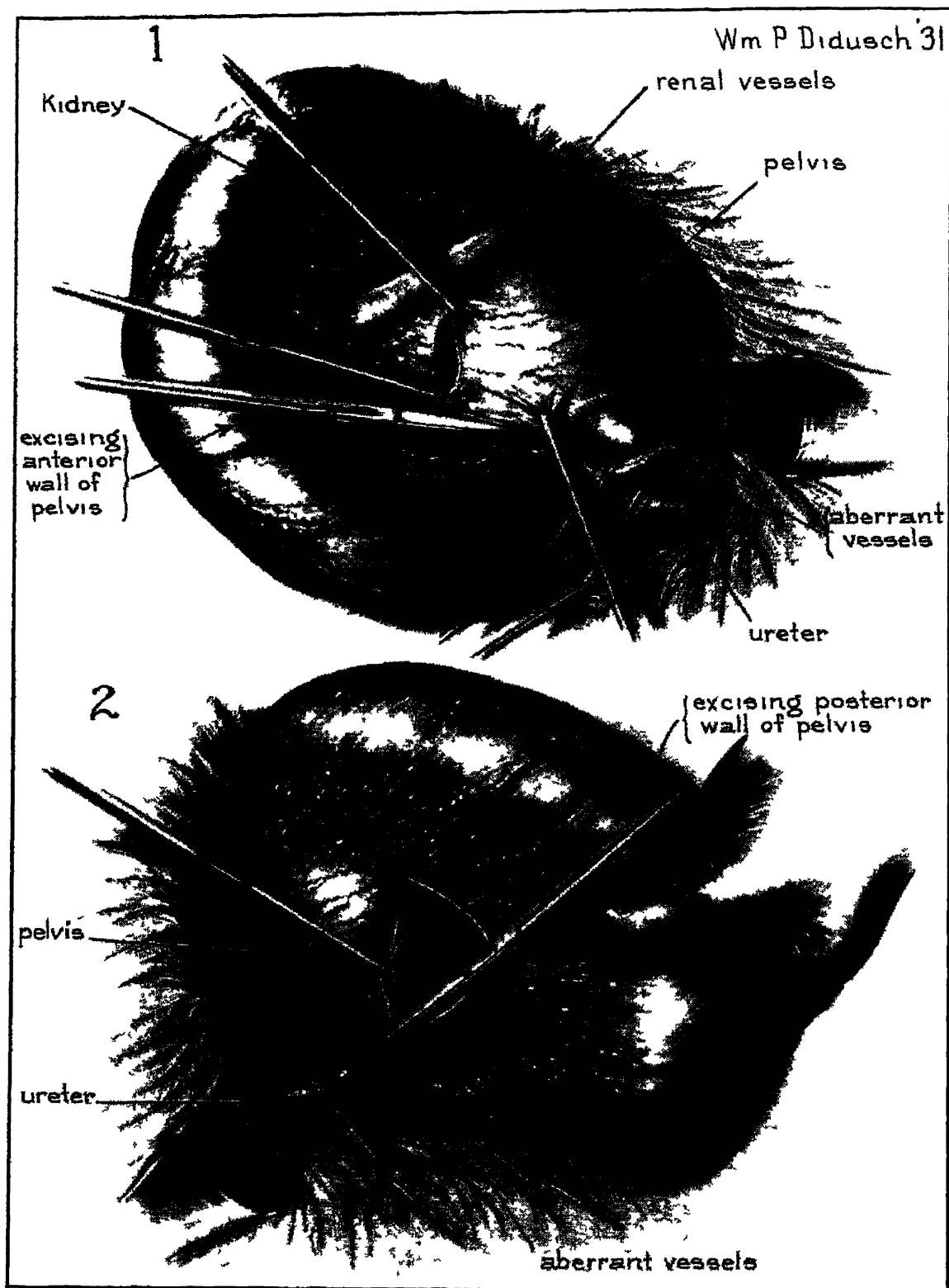


Fig 2—New plastic operation to reduce size of pelvis and also to separate ureter and veins from each other 1, Resection of portion of anterior surface of pelvis, 2, resection of portion of posterior surface of pelvis (Young Surg Gynec Obst)

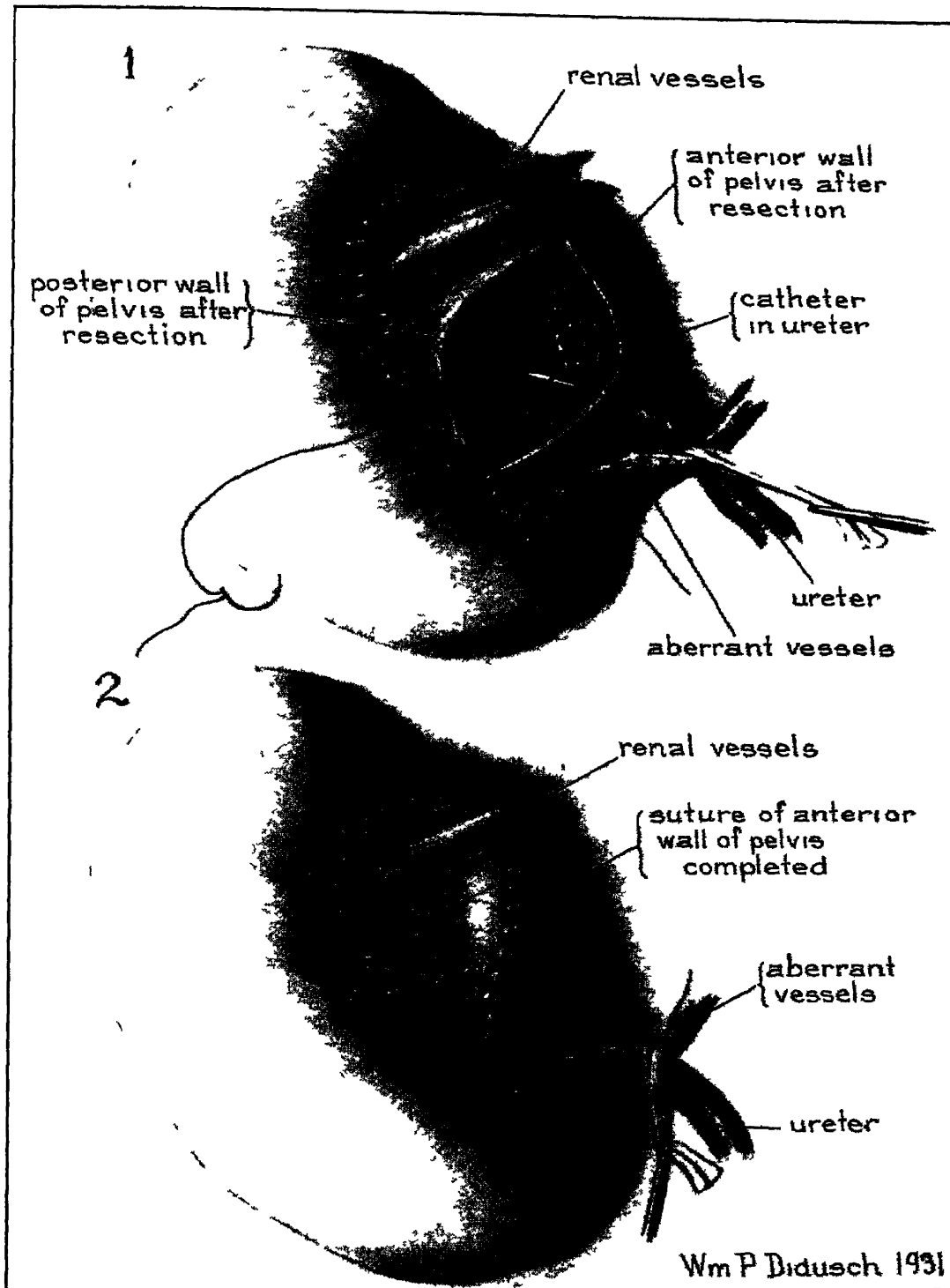


Fig 3 —Sutures employed to close pelvic wound as shown In this way vessels are drawn upward away from ureter on anterior surface of pelvis (Young Surg Gynec Obst)

ureter away from the vessel, he very ingeniously accomplishes this result

Stones very often cause complete obstruction to the ureter but R Dourmash-

rupture of the kidney as a result Again, the same author (J Urol 27 637 (June) 1932) calls attention to the value of intravenous pyelography in the

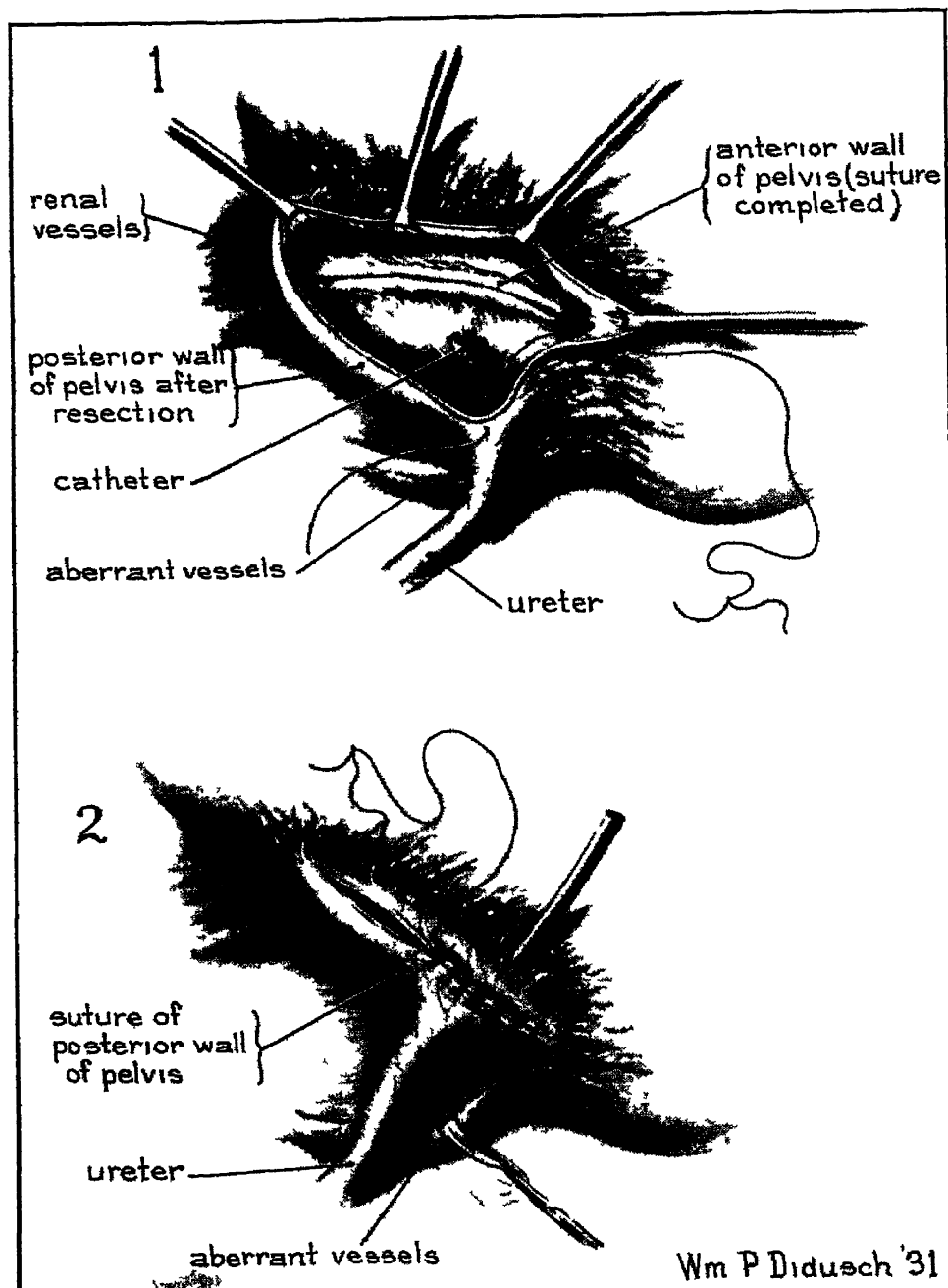


Fig 4—1, Closure of wound after resection of posterior portion of pelvis. Sutures placed so as to draw ureter backward and upward from veins. 2, Completion of closure. Drainage of pelvis and ureter through stab-wound in pelvis near kidney. Note wide separation of veins and ureter obtained. (Young Surg Gynec and Obst)

kin (Urol and Cutan Rev 36 670 (Oct) 1932) reports one of the most unusual pathological entities as a result of an impacted calculus and secondary

management of ureteral calculi. He discusses the value of this procedure as a diagnostic index often of the demonstration of perfect renal drainage even

with the stone in the ureter. He does not believe that any case should be submitted to open operation unless its indications are clearly defined by intravenous pyelography. From a study of 565 cases of ureteral calculi Dourmashkin (J A M A 98 276 (Jan 23) 1932) emphasizes that when the stone is situated in the lower end of the ureter, **prolonged waiting** will often give good results, although the stone may appear to be hopelessly impacted.

B E Fillis (J Urol 28 117 (July) 1932) presents a **dilating ureteral bougie made of sea tangle** with which he dilates the ureter immediately below a *calculus*, which may be dislodged, and is withdrawn with the bougie.

From 75 to 90 per cent of all ureteral stones will pass, according to C P Mathé (*Ibid* 28 133 (Aug) 1932), if the **ureter is dilated below the stone**. He condemns the use of metal instruments for dilating the ureter or for grasping, crushing, and removing ureteral calculi from the ureter. He advises early **ureterolithotomy** for *impacted calculi in the bifid ureter* and in those patients in which it is impossible to make repeated cystoscopic treatments.

Goldman (J Urol 28 371 (Sept) 1932) reports an interesting case of mammoth ureteral *calculus* which weighed 125 grams and on removal was approximately 18 cm in length and 9 cm in circumference. The kidney, although apparently completely destroyed in this case, was not removed. Recovery was uneventful without sinus development and the wound entirely healed in 14 days. Some 6 months later, urological examination revealed that there had been some comeback of this kidney. The urograms on this side showed a considerable diminution in the size of the ureter and the pelvis seemed

to be resuming its normal anatomical outline. The case will be watched to ascertain whether the hydronephrotic atrophied kidney and ureter will return to anywhere near normal functional activity.

TRANSPLANTATIONS—It has become more and more necessary in carrying out the conservative measures upon the kidney to transplant the ureters into the bowel or to the skin surface. This latter is not ordinarily an operation that would be chosen either by the patient or by the urologist, but there are some indications for this latter method. Where, of course, in the opinion of the urologist or surgeon, it is impossible to transplant the ureter into the bowel because of technical difficulties, some other disposition must be made of the urinary drainage. These conditions have been discussed by J C Birdsall and W E Upchurch (Urol and Cutan Rev 36 501 (Aug) 1932). They report 6 cases by Wade, of Edinburgh, where the bladder malignancy was of such advanced nature that it was necessary to transplant the ureters into the lateral aspects of the abdominal wall.

M L Boyd (Internat Clin 1 125 (Mar) 1931) gives the following indications for diverting the normal course of the urinary flow: (1) total cystectomy, (2) partial cystectomy where it is impossible to plant the lower end of one or both ureters into the remaining portion of the bladder, (3) in inoperable cancer of the ureter or bladder with ureteral obstruction which would not be relieved, (4) in irreparable injuries to the ureter, (5) in hydronephrosis caused by irreparable, acquired or congenital changes of the kidney pelvis or the upper end of the ureter, and (6) in marked ureteral obstructions which

for any reason cannot be relieved with certainty or sufficiently promptly. He reports a nephrostomy technic which is unique and has proven efficacious.

R C Coffey (J A M A 99 1320 (Oct 15) 1932) describes 3 types of technic for the transplantation of ureters into the lower bowel. (1) the ureter is drawn into the interlamellar space immediately beneath the intestinal mucosa, its split end being dragged through an opening made in the mucosa at the caudal end of an uncompleted intestinal incision and anchored inside the intestine, (2) a tube or catheter is fastened within the ureter by ligatures which seal the ureter against infection and anchor it to the catheter, after which the catheter is passed through an opening made in the mucosa at the caudal end of an uncompleted intestinal incision and is used to draw the ureter into the interlamellar space beneath the intestinal mucosa and through this opening into the intestinal lumen, and (3) the ureter is brought into the interlamellar space outside the intestinal mucosa by an anchor stitch which fastens the end of the ureter into the angle of the caudal end of an uncompleted intestinal incision. The anastomosis becomes complete within 2 to 4 days after operation.

G S Foulds and T A Robinson (Brit J Urol 4 20 (Mar) 1932) describe the **Peters' operation** for transplantation of the ureters in exstrophy of the bladder. This technic is slightly different from that of Coffey in that he pulls the ureter tied on a catheter through the bowel wall, and in their case they made no attempt to stitch the ureter in position. They leave the catheters in position for at least 2 or 3 days, or until they come away by themselves. They make no attempt to valve the entrance of the ureter into the bowel.

URTICARIA.—TREATMENT.

—J Daniel (Arch d mal de l'app digestif 22 30 (Jan) 1932) calls attention to the frequent appearance of urticaria in individuals with chronic or latent disturbance in the biliary function. These disturbances are often unrecognized. Concomitant with the urticaria there are symptoms of bradycardia, a decreased arterial tension, digestive disturbances, and a positive Hay's test. Believing that the urticaria is due to a retention of bile salts and other substances which are normally eliminated by the biliary routes, the author prescribed **sodium dehydrocholate**. He obtained prompt and permanent results by this means of treatment.

P Chevallier (Paris méd 1 54 (Jan 16) 1932) employs **insulin** in the treatment of urticaria. He states that incessant and rebellious urticaria improved in 2 of his patients when he administered 5 units of insulin twice daily. He considers this the treatment of choice in severe chronic urticaria.

UTERUS.—CERVICAL CANCER.—Treatment.

—It is pointed out by C H Mayo (Surg Gynec Obst 54 690 (Apr) 1932) that the difference in death rate between total abdominal hysterectomy and subtotal abdominal hysterectomy is slight, if any, and that the higher death rate usually attributed to total abdominal hysterectomy is probably due to the selection of graver surgical risks rather than to differences due to operative technic. It is also claimed that more patients would die from the complete operation than from carcinoma developing in the remaining stump of the cervix. If surgeons who fear to perform total hysterectomy accept the responsibility for the future life and health of the patient and feel that

the cervix is a potential source of carcinoma and often a focus of infection, it is suggested that they perform subtotal hysterectomy and follow this procedure 10 or 12 days later by some method of removal of the cervix, of enucleation of the canal, or of destruction of the cervical canal by cautery. Occasionally this procedure brings to light an otherwise hidden early carcinoma. The procedure would not increase the mortality and would accomplish all that could be desired. The patient who has undergone subtotal hysterectomy only should be advised to return from time to time for observation. In some cases it may be advisable to use the **actual cautery** on the cervical stump, or **prophylactic douches**, in an attempt to clear up infection. The views given were reestablished in the author's mind because of a recent review of cases at The Mayo Clinic, which brought to light that, between January, 1910, and July, 1930, 99 patients who had undergone subtotal hysterectomy there or elsewhere had presented themselves later with carcinoma of the remaining stump. In 55 per cent of these, carcinoma had developed 3 years or more after subtotal hysterectomy, and the longest interval was 29 years.

CERVICAL STRICTURE.—Stricture of the uterine cervix is of sufficiently frequent occurrence to warrant the interest of everyone concerned with pelvic diseases in women. A. H. Curtis (J. A. M. A. 98:861 (Mar 12) 1932) discusses the pathology and clinical features of this condition. Among *pre-disposing causes* may be mentioned genital infection or instrumentation, gonorrheal infection, especially where there has been considerable treatment of the cervix, the use of radium, the cautery knife, the curette, operations on the

cervix, senile atrophy, and, finally, fibroid tumors. It is self-evident that strictures will not be found in uteri removed after diagnostic dilatation and curettage.

Important *symptoms* are persistent leukorrhea, dysmenorrhea, the passage of tarry menstrual blood and pelvic discomfort of varying intensity.

The *pathologic changes* include every conceivable variety of strictural obstruction. Dilatation and pocketing of the canal are frequent. *Diagnosis* may be made by intracervical palpation with Hegar dilators of small caliber, occasionally anesthesia being required.

Treatment—Many patients return a year or more after irradiation, annoyed by chronic leukorrhea, or pelvic discomfort incident to retained secretion. **Dilation** may suffice, but recurrence of the obstruction is frequent. **Amputation** of the cervix in women past the menopause is often necessary. The cervix should often be bisected anteriorly and **vaginal hysterectomy** resorted to in patients revealing extensive pathologic changes.

CHORIOEPITHELIOMA.—The typical malignant chorioepithelioma consists chiefly of an anaplastic growth of the cellular elements of the chorion (Langhans' cells and syncytium) with a characteristic deficiency or absence of the connective tissue core. This absence is due to the rapid proliferation of the cellular structures which have many mitotic figures and exhibit marked vacuolation and necrosis with invasion and destruction of adjacent tissue.

Although Ewing states that he has been unable to find any record of cure of malignant chorioepithelioma (choriocarcinoma) following operation, J. E. Lackner and M. L. Leventhal (*Ibid.* 98:1136 (Apr 2) 1932) report spon-

taneous cure in a young woman following hysterectomy and x-ray therapy. These authors claim that the microscopic picture of chorioepithelioma is not always a true prognostic index of the disease. Treatment should be radical. Even when metastases are present, hysterectomy may still be performed, as regression of secondary growths following such treatment has been observed. Irradiation following all operative procedures offers the best result in treatment.

Diagnosis.—A. H. Curtis (Surg Gynec and Obst 54 861 (June) 1932) believes that the incidence of chorioepithelioma of the uterus has been overestimated. Not only is the disease rare, but its presence has often escaped clinical diagnosis, so that cases have usually been available for study only after recognition in the pathologic laboratory. A brief report submitted by the author presents a case with a perfect history of chorioepithelioma in which clinical observation was followed by necropsy and complete pathologic study immediately after death. Incident of the study, colored illustrations were made within the hours immediately following the necropsy, before postmortem discoloration had developed, in order to portray, in lifelike colors, the appearance of the uterine tumors and the visceral metastases. A feature of especial interest was the presence of an easily elicited positive Hegar's sign, which was not only evident during life, but was confirmed at necropsy, before the removal of the uterus from the opened abdomen. The fact that Hegar's sign persisted in the presence of living chorionic cells, despite prolonged absence of the fetus, is worthy of note. The appearance of clinical evidence of chorioepithelioma more than 1½ years after birth of an

hydatid mole is also worthy of note. It has been generally assumed that evidence of malignancy may be depended on to appear at a much earlier date. After passage of a typical mole, the patient should evidently be kept under close observation for an indefinite period of time.

HEMORRHAGE.—*Treatment*—From a review of 105 consecutive cases of uterine hemorrhage of benign origin treated by radium, L. E. Phaneuf (Am J Obst and Gynec 24 225 (Aug) 1932) considers that radium, employed in suitable doses, in properly selected cases, is a valuable agent in the treatment of uterine hemorrhages of benign origin. It finds its greatest field of usefulness in women near or at the menopause, having severe hemorrhages from uteri showing no gross macroscopic lesions, as in hypertrophy and hyperplasia of the endometrium. It should be used cautiously, to avoid hysterectomy, in the hemorrhages of adolescence, and only after medical, endocrinal and hemostatic treatments have failed. Here, minute doses should be employed. The author has never gone over 600 mg hours in this type of case. Radium should not be used to regulate the menstrual periods or in an attempt to favor pregnancy, because of the risk incurred by the product of conception. It is of value in treating small fibromyomas of the interstitial type, especially in women nearing the menopause. A single application, with an appropriate dose, is sufficient to bring on permanent amenorrhea. These patients may be successfully treated with a small amount of radium (0.05 Gm— $\frac{5}{8}$ grain) and with a minimum amount of apparatus.

SARCOMA—Thirteen cases of mural sarcoma of the uterus are reported by S. A. Wolfe (*Ibid* 23 232).

(Feb) 1932) from the Gynecological Laboratory of the Long Island College Hospital Of the 510 specimens removed for supposed fibromyoma of the uterus from September 1, 1923 to December 1, 1929, 13 sarcomas were encountered, an incidence of 2.54 per cent Of these, 8 were primary tumors, including 2 mixed sarcomas of the body; and 5 originated in preexisting fibroids Mural sarcoma of the uterus comprises a primary or de-novo group and a secondary form occurring in preexisting fibromyomas Both are of myogenic origin and arise from orthotopic embryonal rests in the uterine wall or within the confines of a preceding fibromyoma The mixed sarcoma of the uterus is a primary sarcoma of the teratoid type

The degree of maturation of the component cell determines gross appearance, rate of growth and clinical malignancy of these tumors

1 Tumors comprised of differentiated muscle cells (myoma malignum) clinically and grossly simulate fibromyomas They are slow growing, rarely recur or metastasize

2 More actively growing forms appear as spindle, fusiform and round and giant cell sarcomas Grossly, they are homogeneous and opaque, infiltrate relatively early and metastasize by the blood stream

3. Mixed sarcomas comprised of embryonal elements grow rapidly and recur promptly Cell differentiation produces mucoid, smooth and striated muscle, osteoid tissue and cartilage, glands are of local stamp The site of the tumor determines the clinical mode of onset

Primary sarcomas, more frequently submucous, produce bleeding relatively earlier and more constantly than in the

secondary group arising in interstitially placed myomas Both types are most prevalent after the menopause, when fibroids, as a rule, are inactive Diagnostic curettage will yield material for pathologic diagnosis in 50 per cent of primary and secondary sarcomas Uteri removed for supposed fibroids after the menopause require immediate gross pathologic examination to exclude sarcoma **Radical extirpation** followed by **postoperative radiation** is indicated in growths still confined to the uterus Palliation by **radiotherapy** should be the rule for advanced cases *Prognosis*, though generally grave, is surprisingly good in myoma malignum Sarcomas arising in fibroids offer fair prognosis, if of small size and confined within the capsular limits of the original growth

UVEITIS.—ETIOLOGY.—It is pointed out by A. L. Brown (Am J Ophth 15.19 (Jan) 1932) that there is a difference between producing, experimentally, isolated and recurring attacks of uveitis He reports several series of experiments in which eyes of rabbits were sensitized by injecting various antigens in the anterior tissue of the eye Upon introducing the same antigen into other parts of the animal several days later, attacks of uveitis were produced Ocular reaction has been produced after general sensitization by injection into the eye Certain bacteria or toxins can produce a hypersensitiveness so that after the initial infection has quieted, a similar manifestation can be reproduced by intravenous administration of the same antigen For example, he produced an acute uveitis by the intraocular injection of a streptococcus toxin After the subsidence of the inflammation, intravenous

injection of the same toxin 10 days later was followed by recurrent uveitis

W S Duke-Elder (Practitioner 128. 471 (May) 1932) calls attention to the fact that independent inflammations localized alone in the iris, the ciliary body, or the choroid, do not occur. The uveal tract is usually involved as a whole, because all these parts are bathed by a common intraocular fluid, are supplied by vessels which anastomose intimately, and are innervated by identical nerves. Inflammation of one part of the uveal tract may, however, dominate the clinical picture sufficiently to justify the use of the term "iritis." Iritis may be produced by infection introduced into the eye by a perforating ulcer or wound or more commonly by microorganisms or toxic material carried by the blood stream.

The significance of *syphilis* in the etiology of uveitis was investigated by P A O'Leary (Am J Ophth 15:24 (Jan) 1932). The incidence of syphilis at The Mayo Clinic in the last 3 years has averaged slightly more than 5 per cent. The result of the use of antisyphilitic remedies in the treatment of uveitis was not striking, as only 7 of the patients were materially benefited, 6 were improved, and 8 were not helped. The effect of treatment on the syphilis, itself, was more encouraging than were the results of treatment on the uveitis, for slightly more than half of the patients were successfully treated. He found (1) that 6 per cent of a series of 354 patients with uveitis had syphilis, (2) that antisyphilitic treatment brought about material improvement in the uveitis of one-third of these and that it afforded slight benefit in an additional 28 per cent, (3) that

the anterior type of uveitis usually responded more favorably. He concludes (1) that in a small percentage of cases the etiology of uveitis is syphilis, (2) that antisyphilitic treatment is of benefit in more than half of these cases of syphilis, and (3) that in 42 per cent of the cases in which syphilis is not a factor, antisyphilitic remedies are of definite benefit.

PATHOLOGY—According to F A Kiehle (Northwest Med 31:226 (May) 1932), inflammations of the uveal tract are significant because of the consequences which follow ciliary congestion. Dilatation of the vessels of the ciliary body results in alterations in the dialyzed fluid and of the vessel walls. This altered nutritive fluid produces structural and functional changes in the lens and in the anterior segment of the eye which it supplies. When the limbus yields to altered tension, changes in refraction take place. When the sclera does not yield to altered tension, various symptoms of asthenopia ensue. He urges careful search for the etiologic factors in uveitis.

TREATMENT.—In many cases of uveitis, especially in the acute form, E C Rosenow and A C Nickel (Am J Ophth 15:1 (Jan) 1932) have isolated streptococci which possess an elective localizing power. They have found that the teeth, tonsils, prostate, or cervix were the most frequently encountered foci of infection. **Removal of the foci and treatment with autogenous vaccines** prepared from the involved eyes of rabbits that had received injections, have yielded good results. In some cases this latter procedure had no apparent effect but in no case did they observe harmful effects.

V

VAGINAL ENTEROCELE OR HERNIA.—Vaginal hernia or enterocele is a relatively rare clinical entity easily confused with rectocele or cystocele, which are of such common occurrence. For this reason, W. H. Bueermann (J. A. M. A. 99:1138 (Oct. 1) 1932) reports 3 cases and evaluates the data found in 76 cases of vaginal hernia found in the literature.

A vaginal hernia is formed whenever a portion of the abdominal contents pushes a peritoneal sac through an opening in the pelvic floor which presents itself as a bulging into the vagina.

Six distinct types of hernia into the vagina or vulva are described:

1 Cystocele, or hernia of the bladder into the anterior vaginal wall.

2 Rectocele, or hernia of the anterior wall of the rectum, presenting as a bulging into the posterior wall of the vagina.

3 Vaginal enterocele or hernia (a) a peritoneal sac with bowel or omentum presenting either anteriorly, between the bladder and uterus, or posteriorly, between the uterus and rectum, and pushing the posterior vaginal wall upward. (b) Complete uterine prolapse with enterocele.

4 Pudendal enterocele or hernia, a descent of the small intestine into a peritoneal sac extending into the labium majus of one or both sides.

5 Perineal enterocele or hernia, a descent of the small intestine into a peritoneal sac extending through the levator ani muscles and bulging through the ischio-rectal cavity.

6 Hydrocele, a protrusion of the cul-de-sac into the anterior wall of the rectum.

The *posterior* variety of vaginal

enteroceles are more frequently encountered. The *symptoms* are largely those of a rectocele and are not characteristic. *Diagnosis* is often not made before operation, and repeated unsuccessful operations may reveal the true nature of the condition. Bueermann uses a sign not previously described in conjunction with vaginal hernia and considers it to be pathognomonic of small intestinal contents of the sac. The sac is digitally irritated and peristaltic waves are seen to course over the surface of the sac.

Congenital weakness of the pelvic floor and the strain superimposed by pregnancy and delivery are predisposing causes of an uncertain *etiology*. The association of enterocele and rectocele must be considered in diagnosis.

TREATMENT—Vaginal hernias require surgical treatment governed by the principles set down for the **surgical treatment of hernias in general**. Complicating pelvic conditions often prevent a standardized technic being observed. The following principles are advised by the author for the best surgical results.

The sac may best be isolated through a vaginal approach, using the usual incision for the repair of a rectocele or cystocele, depending on whether the hernia is posterior or anterior to the uterus. The contents of the sac can usually be reduced, leaving the peritoneal lining of the sac apparent.

Through the vaginal approach the sac may be disposed of by pushing its contents into the abdomen, ligating the sac high and excising any superfluous portion. If abdominal section is also contemplated, the sac can be pushed into the abdomen with its contents and

the repair of the defect made at the same time. After the abdomen is opened, the sac may be everted and sutured to the posterior wall of the uterus or the redundant portion may be excised.

Repair of the defect at the point of egress may be accomplished from the vaginal approach, by obliterating the cleavage plane through which the hernia emerged. The operation is then completed by approximating the levator ani as in a high perineorrhaphy.

The pelvic floor defect can usually be repaired by obliterating the cul-de-sac of Douglas as in the Moschowitz operation for the cure of rectal prolapse. Other associated pathologic changes, such as uterine displacements, are also amenable to treatment at the same time. If vaginal hernia has been diagnosed before operation, the repair of the pelvic floor defect and obliteration of the cul-de-sac first makes the perineal isolation of the sac an easier and safer procedure.

When vaginal hernia is associated with marked uterine prolapse, a vaginal hysterectomy and repair of the hernia can be carried out successfully at the same time.

Anterior vaginal hernias require obliteration of the vesicouterine space in order to cure the pelvic floor defect.

VARICELLA (CHICKEN-POX).—COMPLICATIONS.—The chief interest in chicken-pox during the last few years has centered about its relationship to *herpes zoster*. In spite of the many facts which seem to prove that the virus of the two diseases is not the same, there has been a steady increase in the number of instances reported in which an infection with one of these diseases follows an

exposure to the other. P. J. Braslawsky (Presse méd 2 1671 (Nov 14) 1931) reported an instance of herpes zoster which was followed in 16 to 18 days by an epidemic of chicken-pox in 7 children who were exposed to this patient. No other source of exposure of the children was evident, since all of them had been in the hospital for 4 weeks and had had no visitors. A similar event was observed by P. F. Armand-Delille and Trocmé (Bull et mém Soc méd d hôp de Paris 48 48 (Jan 25) 1932). A hospital patient 6 years old developed herpes zoster. After 15 to 16 days, 3 other children in the same ward developed chicken-pox and in another 15 days, a fourth patient developed the disease. Another instance was that of an elderly woman, 73 years of age, who developed a herpes zoster behind the left ear which was followed in a short time by a facial paralysis, according to the report of G. H. H. Booth (Brit M J 1 15 (Jan 2) 1932). Fourteen days later, 2 of her grandchildren developed chicken-pox and no other exposure to the disease was known.

Several other complications of chicken-pox have been noticed recently. With the general increase in number of *encephalitis* cases from other causes, it is not surprising that this complication should occur in certain patients with chicken-pox.

H. M. Zimmerman and H. Yannet (Arch Neurol and Psychiat 26 322 (Aug) 1931) observed a 13 months' old infant who developed symptoms of irritability and fever 3 days after the onset of a chicken-pox infection. On the following day, the patient had severe convulsions and died. The spinal fluid contained 20 cells per cmm and was sterile. Lesions which were some-

what characteristic of *encephalitis* were found in the brain and cord at autopsy. There was a perivascular degeneration of the myelin sheaths, evidence of degeneration in the ganglion cells, and a fatty degeneration of the leptomeninges. Small hemorrhagic areas were noticed in the cerebral cortex. A case of *encephalitis* occurring as a complication of chicken-pox was also observed by M. Sendrail and O. Dudevaut (Bull. et mém. Soc. méd. d. hôp. de Paris 48:358 (Mar. 14) 1932). About a week after the onset of the disease, the patient became stuporous, vomited, and had periodic attacks of excitement or convulsions. At this time the cerebrospinal fluid contained 240 cells per c.c., the majority of them lymphocytes. No microorganisms were present. The patient subsequently developed a paresis of the lower extremities, hyperactive reflexes, and choreiform movements of the arms and legs which became quite violent in nature. Within a week, the symptoms subsided and the patient made a complete recovery except for the persistence of a certain instability and behavior characteristics which had not been present before the illness.

Another complication of chicken-pox which involved the nervous system but was somewhat different from *encephalitis* in its manifestations, was reported by E. Nucci (Piat. pediat. 9:93 (Mar.) 1931). An infant 10 months of age developed *polyncuritis* and a slight *paresis* 13 days after the onset of chicken-pox. Recovery was complete.

Stenosis of the larynx occurred during a chicken-pox infection in a child 3 years of age, according to a report of L. Tiberio (Policlinico 39:1397 (Sept. 5) 1932). The absence of a membrane in the trachea and negative cultures from the pharyngeal-laryngeal secre-

tions helped to eliminate diphtheria from the differential diagnosis. It was concluded that the lesion was caused by the chicken-pox itself. A tracheotomy afforded temporary relief to the patient and within 20 days a complete recovery was made.

Another interesting complication of this acute infection which not infrequently occurs is secondary infection of the skin lesions of chicken-pox. Such a complication is reported to have occurred in a child who had been exposed to scarlet fever shortly before the onset of chicken-pox. The case was described by A. V. Salomon (Arch. Pediat. 48:679 (Oct.) 1931). The chicken-pox eruption *was followed immediately by a severe *streptococcal infection in the nose, throat and mastoid cells*. The complications may have been due to scarlet fever, since there had been a definite history of recent exposure to it. A large dose of scarlet fever antitoxin was administered at once and no rash of that disease appeared but numerous abscesses developed on the skin subsequently. It was questionable whether the chicken-pox lesions invaded the areas of irritation on the mucous membranes and skin which had been produced by the secondary infection, or whether the chicken-pox was the primary lesion and opened up avenues of invasions for a secondary invading microorganism.

Multiple small *phlyctenules in the iris* occurring in a patient convalescing from chicken-pox have been described by V. Accardi (Boll. d. ocul. 10:958 (Sept.) 1931). A child, 8 years of age, developed these lesions 3 weeks after the onset of the eruption. They were minute round flecks, gray in color, and resembled the phlyctenules which have been described previously in patients with scarlet fever and smallpox.

TREATMENT AND PROPHELY-LAXIS.—A diagnostic skin reaction to test the susceptibility of a patient to chicken-pox was devised by H Brokman and M Mayzner (*Acta pædiat* 11 364, 1930) Material taken from the pustules of chicken-pox lesions was mixed with physiologic saline solution and heated for $\frac{1}{2}$ hour at 56° C Intracutaneous skin tests with 0.1 c.c. of this solution were performed on 31 children between the ages of 1 month and 3 years Of this group, 15 children had had chicken-pox previously and all of these developed a reaction at the site of the injection at the end of 24 hours The reaction consisted of slight swelling and a redness of an area 1 to 5 cm. in diameter Of the 16 children who had not had a previous attack of this disease, 11 had negative reactions Three of the remaining children were in the incubation periods of chicken-pox and the fourth had had an immunizing dose of diluted material collected from chicken-pox lesions

In the presence of an epidemic of chicken-pox in a ward of sick infants, F Pinna (*Prat pædiat* 9 371 (Sept) 1931) attempted to immunize 53 children by the scratch method, inoculating material collected from chicken-pox vesicles A week later, 24 children developed a single lesion at the site of inoculation, and in addition, some developed a slight chicken-pox exanthem which was very mild and not accompanied by fever Of the 29 children who had no reaction to the immunization, all developed typical chicken-pox lesions later Seven other children who had histories of previous varicella had no reactions to the inoculation Employing a similar method, D Angarano and C. Gabriele (*Pediatrics* 39 1050 (Oct 1) 1931) attempted the im-

munization of a series of patients against chicken-pox Of a group of 12 children, 6 to 12 months of age, 6 were inoculated intradermally with 0.2 c.c. of material taken from chicken-pox vesicles, and 6 received similar injections of diluted material Three children who were untreated served as controls and 2 of these contracted the disease subsequently The inoculated children developed small areas of redness and infiltration at the site of infection within 2 to 4 days after the injection Those who received the undiluted material had a little fever and several developed a slight skin eruption 2 to 13 days later which consisted of small red papules and punctiform vesicles and it was doubtful whether this was due to the vaccination or to the disease itself

Human convalescent serum has been used previously with some success in conferring passive immunity of short duration to patients exposed to chicken-pox In a recent test of the efficacy of this method, less favorable results were obtained

W Gunn (*Brit M J* 1 183 (Jan 30) 1932) administered human convalescent serum in doses of 5 c.c. intramuscularly to a group of 43 susceptible children exposed to the disease Of this group, 33 or 76.7 per cent escaped the infection, while only half of a control series escaped It was concluded that patients exposed to chicken-pox very seldom needed protection, and that the serum was not very active in producing a passive immunity If more complete passive immunity was desired, the writer believed larger amounts of convalescent serum should be given

VERRUCAE VULGARIS.—TREATMENT.—S A Lurie (*Arch Dermat and Syph* 26 95 (July) 1932)

reports 49 patients with verruca who have been treated with intramuscular injections of bismuth salicylate. The injections were given 1 week apart, intramuscularly, into the upper outer gluteal quadrant, the amount injected varying according to the age of the patient. Children from 6 to 10 years of age were given 1 grain (0.065 Gm), from 10 to 13 years of age, 1½ grains (1 Gm) and the older ones 2 grains (1.35 Gm). Recently, however, he has changed his technic. One injection is given and the wart is observed. Regression usually begins immediately, and no further treatment is given until the condition becomes stationary. Subsequent injections are then administered, sometimes with an interval of 2 or 3 weeks. In some cases the warts seem to melt, in other cases they come out like a kernel. The pains and aches become less intense after the first injection. Sometimes 1 injection is sufficient, but 3 may be required.

VIOSTEROL. See ERGOSTEROL, IRRADIATED

VISION.—LOCALIZATION—

By destroying certain symmetric parts of the cerebral cortex in the two hemispheres in rats, K. S. Lashley (J. Comp. Neurol. 53:419 (Dec.) 1931) arrives at the following conclusion: interruption of the optic radiations at their point of emergence from the internal capsule does not destroy the ability to distinguish between light and darkness, but abolishes all capacity to react to visual objects; destruction of a small area in the lateral part of the area striata of the cortex does not destroy the capacity to distinguish the position and the distance of visual objects, but abolishes the capacity to distinguish between visual patterns, partial destruc-

tion of the optic radiations or partial destruction of the lateral portions of the striate area leads to inaccuracy of vision; a lesion in the mesial portion of the striate area in the supposed visual association area, or in the motor and somesthetic areas has no effect on the rate of formation of the visuomotor habit studies or on the capacity to distinguish visual patterns.

LIGHT SENSE.—*Illumination.*—P. W. Cobb (Am. J. Ophth. 15:917 (Oct.) 1932) points out that the term "light sense" has many meanings, due to the fact that any visual or test object requires at least 4 terms for its complete description: two photometric terms, the brightness of the figure and the brightness of its background, *i. e.*, the brightness difference; thirdly, the size of the object; and fourthly, the time of action of the object. The eye ignores changes in light. Dark adaptation indicates 2 distinct phases of vision: (1) vision under dim light without color discrimination, (2) vision under full light with color discrimination. The first has been ascribed to activity of the rods alone, the second, to activity of the cones (with the possible participation of the rods). He concludes that standardized technic in dark-adaptation tests is the most satisfactory method for studying light sense.

VOICE HYGIENE.—Voice hygiene includes not only the necessary treatment and care of the vocal organs, due to acquired forms of speech disturbances, but the correction of the various abnormalities of speech, such as delay in the speech function, stuttering, stammering, lisping, etc. In the former group of cases are included the inflammatory types of laryngitis, paralyzes of the vocal cords, tumors of the upper

respiratory tract, including the mouth and tongue, nasal deformities and pathology in the nose and accessory sinuses. These cases are treated medically or surgically, depending upon the underlying cause.

J. Némai (Monatschr f Ohrenh 65 1451 (Dec) 1931) believes that *chronic hyperemia* and *inflammation of the larynx* are not solely due to external irritants, such as smoke, alcohol, frequent colds, etc., but that anatomic variations in the larynx may lay the foundation for chronic inflammation and inferiority of the vocal organs. If there is any anatomic defect, no matter how slight, which presents an obstacle to the perfect closing of the rima glottidis, the muscles have to put forth an extra effort to overcome this hindrance and hyperemia, fatigue and deficient function of the vocal organ result.

The author describes 4 types of anatomic variations of the larynx which he considers *predisposing factors* for inferior vocal organs. The *first* is premature ossification of the cartilaginous structure of the larynx. If the thyroid notch is deep, it compensates for loss of elasticity of the cartilage, but if it is shallow, the rigidity of the cartilage becomes apparent early and voice production is restricted. The *second* variation described is asymmetry of the larynx resulting from an asymmetric fusion of the laminae of the thyroid cartilage. The rima glottidis is distorted, and usually the vocal folds do not meet at the same elevation. The *third* variation described is the ventral elevation of the vocal folds so that they form an acute angle with the ventral wall of the larynx instead of the customary right angle. The air pressure at this point is increased, and it requires an extra effort for the muscle

to keep the rima glottidis closed. The *fourth* anatomic variation is the incomplete closing of the rima glottidis, leaving a small funnel-shaped aperture at the dorsal end of the opening. This aperture, which the author has called "*fovea subglottica*," is concealed from above by the arytenoid columns, but may occasionally be seen through the tracheal fistula in patients on whom tracheotomy has been performed and has been demonstrated by the author in necropsy specimens. In this type of anatomic variation, adduction may be sufficient for voice production, but an extra burden is placed on the muscles, resulting in hyperemia and finally pachydermia laryngis.

In discussing the *relationship of speech and voice therapeutics to operative laryngology*, R. Sokolowsky (Ztschr f Laryng, Rhin (teil 1 Folia Otolaryng) 20 537 (May) 1931) shows (1) when and what kind of operative interventions are necessary in disturbances of voice and speech, and (2) when and which operative interventions should be avoided. He warns against therapeutic mistakes that may lead to permanent disturbances of speech and voice. His report is based on several decades of practical experience. In the main part of the article he first discusses the relations of operative laryngology to the disturbances of speech. For disturbances of speech, such as *retarded development of speech*, *idiopathic dumbness*, *stammering* and *stuttering*, he gives, as a rule, that an operation on the upper respiratory passages is indicated only when the surgical procedure would be necessary in the absence of disturbances of speech. He considers division of the *frenum linguae* ineffective for the correction of retarded development of speech as well

as for idiopathic dumbness and for stammering. Adenotomy has been suggested as a remedy for stuttering. However, the author thinks that cases in which it is effective are an exception, and that, because the psychic shock might cause an exacerbation of the disorder, it should be avoided unless other conditions, such as inhibited nasal breathing or barycoia of the middle ear, necessitate it.

The rule about the inadvisability of operative treatment for disturbances of speech does not apply to all the forms of rhinolalia. In *rhinolalia clausa organica* surgical treatment is necessary. In *rhinolalia clausa functionalis*, however, an operation is superfluous and, therefore, contraindicated. In *rhinolalia aperta* in children, plastic operation on the palate is advisable, in adults, an obturator. Other forms of surgical intervention on the nose and throat impair the speech more and are, therefore, contraindicated. Only in exceptional cases are they permissible. Speech precaution is necessary in insufficiency of the velum palatinum (adenotomy should not be performed). In most cases of *rhinolalia mixta*, operative intervention on the nose and throat are contraindicated. Only in exceptional cases and under certain conditions are they permissible. The author further discusses the relations of operative laryngology to *phonasthenia*. In regard to operations on the nose, he says that if nasal respiration is inhibited, the obstruction should be removed. In other cases only calm, careful deliberation and functional tests will prevent injurious interventions.

For patients with *singers' nodules* the treatment should commence with enforced silence. However, if a spontaneous retrogression does not set in, opera-

tive treatment should be resorted to. Other forms of organic disturbances of the labia vocale which are discussed are the various types of *paralysis*. In unilateral paralysis of the recurrent nerve the author generally obtained good results with exercises and with other conservative methods, so that an operation was only rarely necessary. In discussing the treatment for paralysis of both musculi thyroarytaenoides interni and of the musculus arytaenoideus transversus, he describes an operation recommended by Katzenstein.

S. Blanton (Ment Hyg 15 270 (Apr) 1931) emphasizes the singular importance of speech in both emotional and intellectual development, and warns that no child should leave school with a speech defect. As a matter of fact, between 5 and 10 per cent of high school and college students suffer from feelings of inadequacy or embarrassment in reciting. For the most part, *stuttering* is a symptom of inability to adjust to the group due to fear, timidity or hate. There is an unconscious inhibition against speech. The author reviews the theories of *stammering*, mentioning the hypothesis of left-handedness, the theory of imagery defect, the supposition that breathing is at fault and the psychoanalytic point of view. An approach by the latter technic leads him to believe that in many cases the stammerer is fixed at an oral-erotic stage, and for illustration he cites several cases of stutterers who were inordinately fond of their own bodies. In such cases he obtains relief by "retraining the emotions and freeing the libido." Unfortunately, he fails to describe the technic of this form of treatment.

The *treatment for stuttering* comprises physical and mental hygiene and speech training. **Mental hygiene in-**

cludes the improvement of home discipline, the elimination of rivalry among siblings and the practice of child guidance generally. In school, the stuttering child should be allowed to speak without receiving special attention because of the speech defect, the danger of other children imitating the stammerer, is, Blanton believes, negligible. **Speech training** includes practice on vowel sounds and training in pitch volume, which he considers of questionable value, and precise phonetic training, which he considers harmful. Practice in speech by means of debates, talks and especially plays and pageants, is highly recommended. As a last word, the author warns against asking the stutterer to speak more slowly, to repeat his sentences or take thought as to how his vocal organs are working.

The *causes of delayed speech* developing in a child are variable. *Congenitally deaf* children are, of course, mute. In children in whom the function of *hearing is diminished*, the acquirement of speech is also delayed. In some children there is *delayed development of the speech center* and association tracts. There are also unexplained instances in which children learn to walk late and to talk the third or fourth year. Ultimately, however, some of them prove to have high degrees of intelligence. Not infrequently, boys, in particular, learn to talk as late as the third year, and sometimes the period of complete speech development lasts much longer. The explanation of these cases is probably to be sought in a *temporary inhibition of normal speech development*. In general, excluding the exceptions already noted, the onset of speech parallels the development of intelligence.

So far as *remedial treatment* is concerned, if the child has normal hear-

ing and intelligence, the ability to speak will develop spontaneously and naturally. Attempts to force the child at an early age might cause mental overstimulation and nervousness. If the child has a defect in hearing or intelligence, **special methods of training** should be begun later in childhood, when the nature of the defect is established.

Studies have been made regarding the *influence of speech defects on the learning ability* in the elementary classes. Hans Durr (*Ztschr f Kinderforsch* 38 218 (Mar 12) 1931) states that children of poor intelligence almost always show poor speech and later poor ability to carry out any form of activity. However, a number of children whose intelligence appears to be normal are backward in their school work. This is undoubtedly due to the fact that hearing not only is necessary to learn to speak, but also plays a considerable rôle in the development of intelligence, much more so than, for instance, sight. It is, therefore, not astonishing that the experimental results of these investigations show that the learning abilities of speech-deficient children are always at about the level of their speech defect. It is important to draw a distinction between stammering that is due to functional reasons, which usually has a profound influence on the development of the child, and organic stammering due to some malformation of the mouth which is usually not influential in this manner. Deaf and dumb children have never been satisfactorily examined, so that their actual intelligence is not known. The agrammatical child usually awakens the impression of being mentally deficient. Stuttering, on the other hand, appears to have little influence on the intelligence.

or learning ability. As a general rule, the author offers the following: the more severe the defect in speech, the lower will be the learning ability. He

also believes that it is wrong to have children of different learning capacities and different speech defects put into the same school classes.

W

WHOOPIING COUGH (PERTUSSIS).—DIAGNOSIS—The cough-plate method of diagnosing whooping-cough has been highly recommended during the last few years. It has seemed to be a fairly accurate test, especially in the early stages of the disease when the symptoms are indefinite and the other methods of diagnosis fail. The disadvantage of any such laboratory procedure is the necessity of having freshly prepared media, access to bacteriology equipment, and the services of a skilled technician. The plate method has been employed with success by A. D. Gardner and P. H. Leslie (Lancet 19 (Jan. 2) 1932). The special medium was prepared in petri dishes and the child was instructed to cough directly on the exposed medium during a natural attack of coughing. The cultures were then incubated for 72 hours, but some colonies of the *pertussis bacillus* usually appeared in 48 hours and could be recognized by their characteristic pearly white appearance. When the influenza bacillus contaminated the cultures, colonies of it appeared in about 24 hours. These were flat and transparent and were distinctly different from the *pertussis bacilli* colonies. When necessary, microscopic examination, agglutination tests and other culture methods were employed to identify the *pertussis bacillus* more accurately.

The data obtained with this cough-plate method corresponded to previ-

ously reported statistics. About 75 per cent of a group of 47 patients were diagnosed as whooping-cough by this bacteriologic method during the first week of their symptoms, 67 per cent during the second week, 75 per cent in the third week, 25 per cent in the fourth week and none thereafter.

PATHOLOGY AND COMPLICATIONS.—Symptoms of the central nervous system which frequently accompany whooping-cough infections have been attributed to acute congestion of the brain from mechanical forces, or to toxins derived from the *pertussis bacillus*. Among the studies conducted last year on this subject, are those of Y. Yamaoka (Ztschr. f. Kinderh. 51: 778, 1931). Toxin produced from cultures of the *pertussis bacillus* was injected into the veins of dogs and no symptoms referable to the central nervous systems of these animals were observed, but, histologically, there was evidence of damage of the brain cells. The nuclei were small and dark and the protoplasm appeared to be homogeneous. When the toxin had been given to the animals in small, repeated doses, there were chronic infiltrative changes of the meninges of the brain, but when the doses of toxin were larger, there was a noticeable damage of the endothelial lining of the blood-vessels.

These observations led the investigator to studies of the factors which influenced the transmission of pertussis

toxin through the blood-vessel walls into the brain tissue (*Ibid* 52 594, 1932) This permeability was determined by intravenous injection of 50 c.c. of carbofuchsin per kilogram of body weight and the measurement of the amount of dye secreted into the cerebrospinal fluid 30 minutes later This amount fluctuated at different times in the same animal and a control test had to be done 5 to 7 days before each experiment Doses of $\frac{1}{20}$ lethal dose of pertussis bacillus toxin twice a day or $\frac{1}{30}$ lethal dose 3 times a day, given intravenously over a period of 1 to 2 weeks, increased the permeability of the hematoencephalic barrier only 1.1 to 1.6 times the normal in 3 of a group of 9 animals observed The conclusion was that this was insufficient evidence that any increased permeability was caused by the pertussis toxin

The influence of certain other factors in increasing the permeability of the hematoencephalic barrier was tested Adrenalin seemed to increase the permeability somewhat when used alone, but together with the pertussis toxin, it had no effect A combination of pertussis toxin injections and an induced pneumococcal infection in the trachea of the experimental animals had no effect on the permeability The production of an acidosis by the administration of calcium chloride or sodium acid phosphate also had little or no effect The increase in the ammonium ion by the administration of ammonium chloride or ammonium carbonate by mouth or subcutaneously seemed to increase the permeability The author was led to conclude that none of the above methods was outstanding proof that an increase of permeability was the true explanation of the central nervous system complica-

tions of whooping-cough The method of experimentation was not considered ideal, since the particles of testing fluid (carbofuchsin) are rather large and may not penetrate the barrier as well as toxin and other substances

Other investigators who have tested the permeability of the hematoencephalic barrier have employed a bacteriophage as an indicator (See Smallpox Vaccination)

Another pathologic effect produced by whooping-cough infection is a lowering of the calcium of the blood B Trambusti and C Sertori (*Riv di clin pediat* 29 633 (Aug) 1931) found a reduction of the blood calcium to 6 to 8 mg per cent in patients in the acute stage of whooping-cough There was an accompanying increase in nerve excitability, as determined by the reactions to a galvanic current

The sedimentation rate of the red blood corpuscles was found by H Helmchen (*Ztschr f Kinderh* 51 643, 1931) to be prolonged in patients with uncomplicated whooping-cough The slow rate is quite evident in early stages of the disease and the test has been employed with success in making a diagnosis of whooping-cough in doubtful cases

TREATMENT.—The reports of the last year on the value of vaccine therapy in whooping-cough have varied considerably in regard to the results obtained The failure of the vaccine to give uniformly good results in the hands of all clinicians has raised some skepticism as to its value F. Grunberg (*Ibid* 51 741, 1931) employed a mixed vaccine in doses of 2000 to 6000 million killed bacilli every third or fourth day in the treatment of uncomplicated cases of whooping-cough Of these, 59 were under 2 years of age, and 40 were in the

first week of their illness. No beneficial effect was noticed in 75 per cent of these patients. Various drugs such as allonal, adalin, atropine, bromides and papaverin were used in 155 other whooping-cough patients, but no better results were obtained.

One group of patients was allowed to remain in the open air throughout the course of the disease and one-third of this number experienced mild attacks of short duration so that the conclusion was reached that the **fresh air treatment** was as good as or better than, any of the above methods.

No beneficial results from **vaccine** treatment were noted in a series of 50 pertussis patients by M. Weichsel (*Monatschr f Kinderh* 52:37 (Feb 23) 1932). The vaccine was administered during the early paroxysmal stages of the disease in 6 injections of 1 c.c. each on alternate days.

E. G. Westendorff (*Ibid* 52:261 (Mar 23) 1932) observed clinical improvement from **vaccine therapy** in only 2 patients of a group of 20 children with whooping-cough. Although the material gives little or no help in the majority of instances, the occasional patient may receive benefit from it, if given early.

Other investigators have reported more favorable results with pertussis **vaccine**, especially when it is given early in the course of the disease. H. Gentzsch (*Ibid* p 273) employed a pertussis vaccine containing an addition of other killed microorganisms frequently found in respiratory infections. Twenty-six children of a group of 48 pertussis patients were thought to have had an attenuated attack as a result of the treatment. The author observed no better results with massive doses than with the ordinary amounts. Similar results

were reported by L. Ihm and F. Kruse (*Munchen med Wchnschr* 78:1779 (Oct 16) 1931), who employed a mixed stock vaccine in the treatment of 87 pertussis patients and observed improvement in 75 (84 per cent).

Other methods of treatment of whooping-cough have included use of **human convalescent serum**. The available sources of this serum are infants and children and this treatment will be limited by the lack of material. That it has some therapeutic value is suggested by J. C. S. Battley (*Arch Pediat* 48:675 (Oct) 1931), who reported the use of serum and of whole blood from a convalescent whooping-cough patient in the treatment of 2 infants, 1 year of age and 3 weeks of age, respectively. The material was given at the end of the first week of the disease in one instance and in the fourth or fifth week in the other. Both seemed to improve rapidly thereafter.

A new method of treatment of whooping-cough patients directed especially to the prevention of pulmonary complications was suggested by Y. Henderson (*J A M A* 99:654 (Aug 20) 1932). He proposed the **inhalation of a carbon dioxide gas** in low concentrations. The theory advanced was that the hyperventilation of the lungs produced by the stimulation of the respiratory centers would clear the lungs of mucus, reduce the number and intensity of paroxysms and thereby diminish the possibility of pneumonia as a complication. A 6 to 7 per cent mixture of carbon dioxide is recommended which can be administered by means of a mask or a tent arrangement, for periods of 10 to 15 minutes, twice a day. Employment of this treatment in 10 children between the ages of 9 months and 7 years who were suffering

from severe paroxysms of whooping-cough was followed by a diminution of the symptoms within 4 days and considerable improvement by 8 days

Gold tribromide has been used in the treatment of 30 children with whooping-cough by J Epstein (Arch pediat 49 1 (Jan) 1932) The drug was administered by mouth in doses of $\frac{1}{30}$ to $\frac{1}{10}$ grain (0.0022 to 0.0064 Gm) 3 times a day depending on the age of the child and severity of infec-

tion Comparison was made with 15 other pertussis patients treated in the usual manner The children receiving gold bromide recovered more rapidly, and without any complications or fatalities, while in the control group the course of the illness lasted longer and 5 developed complications of the respiratory tract

X-RAYS. See RADIUM AND X-RAYS

INDEX

- A** **Abdominal injuries, 1**
 laparotomy, immediate, in, 6
 penetrating wounds, 4
 gunshot wounds, 4
 blood transfusion in, 4
 dextrose solution in, 4
 elevation of head of bed in, 4
 morphine in, 4
 nothing by mouth in, 4
 perfringens serum in, 4
 saline solution in, 4
 tetanus serum in, 4
 stab wounds, 4
 bladder, rupture of, 4-5
 symptoms, 5
 diagnosis, 5
 prognosis, 5
 treatment, 5
 drainage in, 5
 Fowler position in, 5
 measures to combat shock in, 5
 permanent catheter in, 5
 suture in, 5
 bladder wounds in surgical operations, 5
 immediate suture in, 5
 retention catheter in, 5
 subcutaneous, 1
 symptoms, 2
 bladder, 3
 laparotomy in, 4
 suture in, 4
 duodenum, 2
 gastroenterostomy in, 2
 resection in, 2
 suture in, 2
 gastrointestinal, 2
 intestine, 2
 artificial anus in, 2
 resection in, 2
 kidney, 3
 expectant treatment in, 3
 nephrectomy in, 3
 liver, 3
 mesentery, 3
 omentum, 3
 pancreas, 3
 drainage in, 3
- Abdominal injuries, subcutaneous, pancreas (continued)**
 partial removal in, 3
 suture in, 3
 spleen, rupture of, 3
 blood transfusion in, 3
 iodoform gauze packing in, 3
 splenectomy in, 3
- Abdominal surgery, 6**
 anesthesia, general, in, 6
 spinal, in, 6, 81
 gauze sponge in, 6
 incision in, 6
 Trendelenburg position in, 6
 postoperative complications, 6
 rupture of incision, 6
 prophylactic measures, 7
 abdominal binder in, 7, 8
 avoidance of catgut suture of fascia in, 7
 vitamine C in, 7
 treatment, 8
 drainage in, 8
 metal sutures in, 8
 silk sutures in, 8
 viscera rinsed with normal salt solution and replaced in, 8
 postoperative treatment, 8
 diathermy in, 8
 gastric lavage in, 8
 saline-dextrose solution in, 9
- Abortion, 9**
 mortality in, 602
 inevitable, 9
 diagnosis, 9
 estrin tests in, 9
 Aschheim-Zondek test in, 9
 therapeutic, 9
 x-ray irradiation in, 9
- Abscess of brain, 178**
 of lungs, see Lungs, abscess of
 of orbit, 634
- Abstinence manifestations, twilight sleep in, 76**
- Acacia, 9**
Acetarzone, 10
 untoward effects, 10
Acetylcholine, 11

- Acetylcholine (*continued*)
 - physiological action, 11
- Acetylsalicylic acid, 11
 - untoward effects, 11
 - solubility, 12
- Achlorhydria in anemia, hydrochloric acid
 - in, 43
- Acid-base diet, 330
- Acne, 12
 - diet in, 308
- Acne rosacea, 12
- Actinomycosis, free drainage in, 781
 - hot wet compresses in, 781
 - potassium iodide internally in, 781
 - radium, screened, in, 781
- Acoustic nerve, tumors of, 12, 374
- Addison's disease, 12
 - metabolism, 12
 - treatment, 13
 - avoidance of physical and mental strain in, 14
 - cortin in, 43
 - dextrose in, 13
 - diet in, 14
 - elimination, proper, in, 14
 - interrenalin in, 13
 - preparation of extracts, 14
 - normal saline solution in, 13
 - rest in, 14
- Addisonian pernicious anemia, etiology, 35
- Adenocarcinoma of ampulla of Vater, 370
 - of kidney, 524
 - of lacrimal gland, 528
- Adenoma of bronchus, 190
 - of intestine, 506
 - of pituitary gland, 727
- Adenosarcomata of kidney, see Kidney,
 - adenosarcomata of
- Adhesions, congenital, of duodenum, 365
 - pleural, 729
- Agranulocytosis, 170
 - x-rays in, 170
 - chronic, 170
- Alcoholic pseudo-pellagra, 14
- Alcoholism, 14
 - diagnosis, 15
 - treatment, 16
 - belladonna, tincture of, 16
 - catharsis in, 16
 - enema in, 16
 - hyoscyamus, fluid extract of, in, 16
 - irrigations, high, in, 16
 - lumbar puncture in, 16
 - salines in, 16
 - xanthoxylum, fluid extract of, in, 16
- Allergic episcleritis, 27
 - headache, 26
 - migraine, 25
 - skin diseases, 27
 - explanation of, 381
- Allergy, 17
 - food, 338
 - in children, 17
 - diagnosis, 17
 - treatment, 17
 - desensitization in, 17
 - elimination of exciting factors in, 17
 - palliative methods in, 17
 - physical, 28
- Amaurotic family idiocy, 593
 - etiology, 593
 - pathology, 593
 - treatment, 594
 - juvenile form, 594
- Amblyopia, 29
 - treatment, 29
 - routine ocular examinations in, 29
 - special classes in, 29
 - ex anopsia, 29
 - bar reading device in, 29
 - operation, early, in, 29
 - systematic training of squint cases in, 29
 - toxic, 29
 - etiology, 30
- Amebiasis, see Parasites amebiasis
- Amenorrhea, 32
 - treatment, 32
 - anterior pituitary gland, raw extract of, in, 32
 - blood from patients in last half of pregnancy in, 32
 - sistomensin in, 32
 - whole ovary, raw extract of, in, 32
- Ametropia, 32
 - etiology, 32
- Ampulla of Vater, carcinoma of, choledochoduodenostomy in, 370
- Analgesia, drugs producing, 32
- Anemia, 33
 - laboratory classification, 34
 - etiology, 35, 303
 - symptomatology, 38
 - complications, achlorhydria, hydrochloric acid in, 43
 - Addison's disease, cortin in, 43
 - hemorrhage, acute, acacia solution in, 43
 - stop bleeding in, 43
 - transfusion in, 43

Anemia, complications (*continued*)

- hemorrhage, chronic, iron in, 43, 44
 - stop bleeding in, 44
 - Hodgkin's disease, radium in, 43
 - x-rays in, 43
 - leukemia, lymphatic, radium in, 43
 - x-rays in, 43
 - leukemia, myelogenous, radium in, 43
 - x-rays in, 43
 - lymphosarcoma, radium in, 43
 - x-rays in, 43
 - myxedema, thyroid therapy in, 43
 - differential diagnosis, 39
 - diagnosis, 39
 - diagnostic methods, 40
 - treatment, 42
 - ammonium citrate in, 45
 - diet in, 341
 - iron in, 41, 44, 45
 - liver therapy in, 41, 42, 43, 44
 - stomach, desiccated, in, 44
 - aplastic, removal of cause in, 43
 - transfusion in, 43
 - dietary deficiency, diet in, 44
 - iron in, 44
 - liver in, 44
 - due to infection, 41
 - removal of infection in, 44
 - transfusion in, 44
 - due to intestinal parasites, anthelmintics in, 43
 - iron in, 43
 - sanitation in, 43
 - due to malaria, sunlight in, 43
 - ultraviolet light in, 43
 - hypochromic, iron in, 44
 - pernicious, symptomatology, 39
 - diagnosis, 40, 41
 - treatment, diet rich in nuclear material in, 43
 - liver diet in, 40, 41
 - nuclear extract in, 40
 - Addisonian, etiology, 35
 - of pregnancy, see Pregnancy complications, anemia
 - secondary, copper in, 43
 - diet in, 43
 - iron in, 43
 - sickle cell, splenectomy in, 43
- Anemia of childhood, 51**
- definition, 51
 - etiology, 51
 - treatment, 52
 - iron, organic vs inorganic, in, 52
 - iron and copper in, 52

Anemia of childhood, treatment (*continued*)

- liver in, 52
 - associated with infection, 53
 - Gaucher's disease, 55
 - blood picture, 55
 - diagnosis, 55
 - prognosis, 57
 - pernicious anemia, 48
 - blood picture, 49
 - etiology, 49
 - nutritional, 49
 - synonyms, 49
 - definition, 49
 - etiology, 49
 - treatment, 50
 - amino-acids in milk anemia, 51
 - arginine in, 51
 - glutamic acid in, 51
 - food in, 50
 - iron and copper in, 50
 - irradiation in, 51
 - oysters in, 51
 - sickle cell, 57
 - diagnosis and symptoms, 57
 - of newborn, 47
 - synonyms, 47
 - definition, 47
 - symptoms, 48
 - prognosis, 48
 - treatment, 48
 - transfusion in, 48
 - of premature infants, 46
 - synonyms, 46
 - definition, 46
 - etiology, 46
 - symptomatology, 46
 - blood picture, 46
 - prophylaxis, 47
 - ferrous ammonium citrate in, 47
 - liver fraction in, 47
- Anesthesia, 58**
- premedication, 58
 - amytal in, 59
 - avertin in, 59
 - barbiturates in, 59
 - bromides in, 59
 - chloral in, 59
 - chlorethane in, 59
 - hyoscine in, 59
 - morphine in, 59
 - morphine-hyoscine in, 59
 - nembutal in, 59
 - oil and ether in, 59
 - paraldehyde in, 58, 59
 - pentobarbital sodium in, 58

Anesthesia, premedication (*continued*)

- pernocton** in, 59
- tribromethyl alcohol** in, 58
- physiological action, 59
- complications, 61
 - nausea and vomiting, **carbon dioxide** in, 65
- respiratory, 61
 - carbon dioxide** in, 61, 62
 - massage**, direct, in, 62
 - oxygen** in, 62
 - puncture of auricle** in, 62
 - inversion**, partial, in, 62
 - massage**, subdiaphragmatic, in, 62
- anesthetic drugs, 62
 - avertin**, 62
 - results and advantages, 62
 - untoward effects, **dioxide** in, 64
 - ephedrine hydrochloride** solution in, 64
 - pyramidon** in, 64
 - carbon dioxide**, 65
 - in hiccups, 65
 - in nausea and vomiting of anesthesia, 65
 - in postoperative pulmonary complications, 65
 - chloroform**, administration, 65
 - untoward effects, 65
 - carbon dioxide** in, 203
 - delayed poisoning, 66
 - dextrose** therapy in, 66
 - sodium bicarbonate** in, 66
- ether**, 66
 - endotracheal inhalation, 66
 - technic, 66
 - untoward effect, 66
 - carbon dioxide** in, 203
 - convulsions, 66
 - carbon dioxide and oxygen** in, 67
 - raising of head** in, 67
- ethyl chloride**, 67
 - dangers, 67
- ethylene**, 67
- gas, **carbon dioxide** following, 203
- nitrous oxide**, 67
 - carbon dioxide** in, 68
 - morphine sulphate** in, 68
- nupercaine**, 73
 - untoward effects, 73, 74
 - indications, 74
 - in cystoscopies, 74
 - in genitourinary surgery, 74
 - sodium amytal**, 68
- caudal anesthesia, 74

Anesthesia, caudal anesthesia (*continued*)

- indications, in circumcision, 76
 - in cystoscopies, 74
 - in hydroceles, 74
 - in orchidectomies, 74, 76
 - in prostatic abscess, 76
 - in scrotal hernia, 74
 - in testicular tumors, 76
 - in urology, 74
- endobronchial closed anesthesia, 70
- intratracheal inhalation anesthesia, 70
 - technic, 70
- local, 71
 - complications, 73
 - gangrene of toes, 73
 - massage of toes** in, 73
 - indications and methods, 71
 - in adnexotomies, 71
 - in anterior hysterotomy, 73
 - in appendectomy, 71
 - in Cesarean section, 71, 73
 - in curettage for incomplete abortion, 73
 - in gynecologic laparotomies, 71
 - in interruption of pregnancy, 73
 - in intraabdominal operations, 71
 - in obstetrics, 73
 - in supravaginal amputations, 71
 - in uterine extirpation, 71
 - in vaginal operations, 71, 72
 - in ventrofixations, 71
 - in Wertheim's radical operation, 71
- peridural, 84
 - caffeine** in, 84
 - chloroform** in, 84
 - ether** in, 84
 - indications in lumbar operations, 84
 - in upper respiratory operations, 84
- sacral block, 74
 - indications in perineal prostatectomy, 74
- spinal, 76
 - nupercaine** in, 80
 - experimental studies, 76
 - girdle-formed anesthesia, 77
 - physiological action, 78
 - circulatory changes, 78
 - ephedrine** in, 79
 - artificial respiration** in, 79
 - untoward effects and complications, 79
 - nausea and vomiting, **carbon dioxide** in, 65
 - indications, 81
 - in abdominal surgery, 81
 - in appendicitis, 82

- Anesthesia, spinal, indications** (*continued*)
 in biliary operations, 82
 in bladder operations, 82
 in duodenal operations, 82
 in extremities operations, 82
 in gynecological operations, 82
 in hernia, 82
 in intestinal obstruction and tumors, 82
 in perineum operations, 83
 in peritonitis, 82
 in prostatic operations, 82
 in stomach operations, 82
 in thromboangitis obliterans, 83
 controlled spinal, 84
 technic, 85
 indications, in chordotomy, 85
- Anesthetics in therapy**, 86
- Aneurisms, arteriography in diagnosis**, 802
- Angina, lymphoid, cellular**, 172
- Angina pectoris, diagnosis**, 221
 pain in, 226, 227
 treatment, **pancreatic extract** in, 227
 and hyperthyroidism, 254
- Angiography**, 802
- Angioma of intestine**, 506
- Animal extracts**, 86
 corpus luteum, 86
 therapeutics, 86
 in uterine hemorrhages, 86
- estrin**, 87
- pituitary gland**, 87
 preparations, 87
 in amenorrhea, 87
 in menstrual disorders, 87
 in oligomenorrhea, 87
 administration, 87
- Anophthalmos**, 414
 diagnosis, 414
- Anosmia**, 630
- Anuria, reflux, renal decapsulation in**, 527
- Anus, carcinoma, squamous cell, radium in**, 789
 surgery in, 789
 epithelioma of, radium in, 789
- Aortitis, syphilitic**, 244
- Apicitis, see Petrousitis**
- Appendicitis**, 88
 statistics, 88
 bacteriology and pathology, 88
 etiology, 89
 diagnosis, 90
 of chronic appendicitis, 92
 of perforation, 96
 mortality, 94
- Appendicitis** (*continued*)
 treatment, 95
 appendectomy in, 95
 technic, 95
 bipp in, 95
 liquid paraffined gauze in, 95
 local anesthesia in, 95
 in children, 96
 diagnosis, 97
 complications, 98
 in pregnancy, 98, 603
 surgical intervention in, 100
- Appendix**, 100
 appendicosis, 100
 carcinoma of, 101
 cystadenoma of, 101

 mucocoele of, 102
 appendectomy in, 102
 occlusion of, 102
 pseudomyxoma of, 101
 surgical treatment in, 101
 sarcoma of, 101
 tumors of, 101
- Argyrosis**, 286
 sodium thiosulphate in, 286
- Arrhythmias, cardiac**, 217
 in children, 209
- Arsenic**, 103
 poisoning, 103
- Arsphenamine**, 103
 untoward effects, 103
 bone-marrow disorders, 103
 blood transfusions in, 104
 sodium thiosulphate in, 104
 dermatitis, 308
 polyneuritis, 105
 prevention of reaction, 104
 atropine sulphate in, 104
 calcium gluconate in, 104
 ephedrine in, 104
 epinephrine in, 104
 iodide in, 104
- Arterial diseases of extremities**, 105
 classification, 106
 tests for occlusion and spasm of peripheral blood-vessels, 107
 blood-pressure, 110
 normal vasodilatation level, 107
 occlusion index, 107
 oscillometry, 110
 procaine block of posterior tibial nerve, 107
 technic, 108

- Arterial diseases of extremities, tests (*continued*)
 vasodilatation in response to immersing
 in warm water, 109
 x-rays, 111
 treatment, 112
 foreign protein in, 113
 vasodilator drugs in, 114
 vein ligation in arteriosclerotic and diabetic gangrene, 114
 thromboangitis obliterans, chordotomy in, 117
 spinal anesthesia in, 83
 sympathectomy in, 115
 foreign protein, preoperative, in, 117
 hospitalization and medical treatment, preoperative, in, 117
 vaccine therapy, preoperative, in, 117
 Arterial hypertension, potassium thiocyanate in, 873
 Arteriography, 802
 Arthritis, 117
 definition, 117
 classification, 117
 etiology, 118
 biliary infection, 166
 pathology, 120
 concomitant pathology, 121
 specific joint pathology, 121
 symptomatology, 122
 treatment, 123
 arsenic in, 127
 baths in, 124
 diet in, 123, 342
 glucose in, 126
 histamine in, 125
 immuno-transfusion in, 126
 massage in, 124
 motion, mild active or passive, in, 123, 124
 physical therapy in, 126
 physiological rest in, 123
 salicylates in, 127
 sodium iodide in, 126
 sympathetic ganglionectomy in, 126
 transfusions in, 126
 trunk resection in, 126-127
 vaccination in, 125
 x-rays in, 124
 Asbestosis, 127
 Asphyxia neonatorum, 618
 pathology, 618
 treatment, oxygen in, 619
 Asthenia, neurocirculatory, 128
 diagnosis, 128
 Asthenia, neurocirculatory (*continued*)
 treatment, 128
 adrenal denervation, technic, 128
 novocaine in, 128
 spinal anesthesia in, 128
 immediate operative results, 129
 end-results, 129
 Asthenopia, 129
 symptoms, 129
 Asthma, 17
 etiology, 17
 sinusitis, 822
 diagnosis, atropine test, 139
 complications, 20
 arthritis, 20
 treatment, 21
 aromatic spirit of ammonia in, 19
 calcium gluconate in, 193
 desensitization in, 18, 19
 elimination of offending substances in, 18, 19
 ephedrine sulphate in, 193
 fever therapy in, 21
 oil-ether by colon in, 86
 substance P in, 22
 urinary protease in, 21
 Atelectasis, 129
 pathogenesis, 129
 aerodynamics, 130
 prophylaxis, carbon dioxide-oxygen mixtures at end of anesthesia, 130, 137
 in newborn, 619
 postoperative, carbon dioxide in prophylaxis of, 204
 oxygen in prophylaxis of, 204
 Atherosclerosis, 137
 Atropine, 139
 test in asthma diagnosis, 139
 Auricular fibrillation, 218
 digitalis in, 218
 quinidine in, 218
 in children, 210
 prognosis, 210
 treatment, 210
 bed rest in, 210
 digitalis in, 210
 in Graves's disease, 256
 treatment, 256
 quinidine in, 255, 256
 Auricular flutter, 217
 digitalis in, 218
 quinidine in, 218
 Avertin, 62
 results and advantages, 62

Avertin (*continued*)

- untoward effects, carbon dioxide in, 64
- ephedrine hydrochloride solution in, 64
- pyramidon in, 64

Bacteremia, 139

Bacteriology, 676

- culture of tubercle bacilli, 678
- stains, 677

- glycerine bacterial stains, 677
- tubercle bacillus stains, 678
- capsule stain for bacteria, 678
- reticulocyte stain, 678

typing, 679

- rapid method for pneumococcus, 678

Bacteriuria in pregnancy, 604, 763

Banti's disease, splenectomy in, 44

transfusion in, 44

Basal metabolism, 140

Basophilism, 728

Baths, 475, 476

Bilharziasis, endemic, tartar emetic in, 445, 446

Biliary tract, 142

physiology, 142

bacteriology, 143

diagnosis, 146

surgical treatment of diseases of gall bladder, 154

anastomotic operations in, 158

cholecystectomy in, 155, 156, 157

cholecystoduodenostomy in, 160

cholecystogastrostomy in, 156

cholecystostomy in, 155, 156

choledochoduodenostomy in, 160, 161

choledochostomy in, 155

graded surgery in, 156

ligation of hepatic artery and grafting terminal head into portal vein in, 161

plastic reconstruction of common bile duct, 161

indications for biliary surgery, 154

(1) obstruction of cystic duct, 154

(2) recurrent or persistent irritation and infection of gall-bladder, 154

(3) obstruction of common bile duct, 154

(4) stones without symptoms, 154

results and mortality of biliary surgery, 162

cholecystectomy, 165

cholecystostomy, 163

biliary infection and arthritis, 166

Bilirubin, estimation of, 686

Birth palsies, cerebral, 268

muscle training in, 268

physical therapy in, 268

Bismuth, 167

untoward effects, 167

Bladder, 167

foreign bodies in, 169

injuries of, 3

laparotomy in, 4

suture in, 4

rupture of, 4, 5, 169

symptoms, 5

diagnosis, 5

prognosis, 5, 169

treatment, 5, 169

drainage in, 5, 169

Fowler position in, 5

measures to combat shock in, 5

permanent catheter in, 5

suture in, 5

tumors of, 167

treatment, 167

cautery in, 168

coagulation in, 168

cystectomy, total, in, 168

desiccation in, 168

diathermy in, 168

fulguration in, 168

radium in, 167, 168, 169

radon seeds in, 168

amyloid tumor, 167

cancer, 167

cautery in, 168

cystectomy in, 445

cystotomy in, 445, 787

electro-coagulation in, 169

radium in, 167, 168, 169, 786, 787

removal of entire tumor with fulguration of base in, 445

x-ray in, 169

flat infiltrating, radon seeds in, 786

leiomyosarcoma, 169

resection in, 169

myxosarcoma, 168

cystectomy, total, in, 168

papillomata, cautery snare in, 786

fulguration in, 785

radon implants in, 785, 786

suprapubic cystotomy in, 786

villous, d'Arsonval high frequency currents in, 445

sarcosarcoma, 169

cystectomy, total, in, 169

wounds in surgical operations, 5

immediate suture in, 5

- Bladder, wounds in surgical operations
(*continued*)
 retention catheter in, 5
- Blepharoconjunctivitis, 286, 416
 cerophthol in, 416
 iodol in, 286
- Blood dyscrasias, 169
- Blood examination, 683
 determination of inorganic sulphur, 683
 reagents, 683
 method, 684
 standard, 684
 low plasma protein content, 684
 procedure, 685
 sedimentation test in gynecology, 685
- Bones, 173
 influence of dietetic and environmental factors, 173
 disease due to defective feeding, 174
 hypervitaminosis D, 175
 cod-liver oil in, 176
 osteitis deformans (Paget's disease), 177
 treatment, 178
 high calcifying diet in, 178
 osteitis fibrosa cystica, generalized (von Recklinghausen's disease), 176
 parathyroid and bone structure, 176
 treatment, 176
 removal of enlarged parathyroid in, 176
 x-ray therapy in, 176
 of tetany, parathyroid extract in, 176
 osteomalacia, etiology, 302
 calcium in, 175
 vitamine D in, 175
 rickets, 174
 etiology, 302
 prevention, 174
 cod-liver oil in, 175
 irradiated milk in, 481
 treatment, cod-liver oil in, 175
 irradiated ergosterol in, 175
 irradiated milk in, 481
 osteotomy in, 175
 vitamine D in, 175
 renal rickets, 178
 kidney and bone structure, 178
 tumors, malignant, 178
 treatment, 178
 radiation in, 178
 radical surgery in, 178
- Bothriocephalus anemia, diagnosis, 663
- Brain, 178
- Brain (*continued*)
 abscess, 178
 concussion of, 436, 440
 contusions of, 436
 diathermization of, 384
 tumors, 179
 classification, 179
 symptoms, 179
 diagnosis, 181
 encephalography, 183
 ventriculography, 182
 x-rays, 183
 differential diagnosis, 183
 metastases, 187
 surgical mortality, 187
- Breast, see Mammary gland
- Breast milk in infant feeding, 476
- Bright's disease, acute, decapsulation in, 609
 nephrotomy in, 609
 removal of foci of infection in, 609
- Bromsulphalein test of liver function, 544
- Bronchiectasis, 189
 diagnosis, endoscopy in, 396
 treatment, 189
 belladonna, 189
 excision in, 396
 gymnastic exercises in, 189
 hygiene in, 189
 inhalations in, 189
 open-air in, 189
 operative treatment, 189
 lobectomy in, 190
 postural drainage in, 189
 potassium iodide in, 189
 respiratory exercises in, 189
 rest in, 189
 spraying nose and throat with glycerin solution in, 189
- Bronchitis, sun, 190
- Bronchoscopy in children, 394
 indications, 394
 in bronchopulmonary suppuration, 394
 in bronchial obstruction due to papillomata, 394
 in foreign bodies in bronchi, 394
 in stenosis, congenital, 394
 inflammatory, 394
- Bronchostenosis, diagnosis, 394
- Bronchus, benign tumors of, 190
- Buerger's disease, see Thromboangitis obliterans
- Burns of conjunctiva, 287
 glycerite of tannic acid solution in, 287

- Cacosmia**, 630
- Calcaneum**, fracture of, 420
- Calcium**, 191
- administration and dose, 191
 - metabolism in convulsions, 293
 - physiological action, 192
 - absorption, 192
 - therapeutics, 192
 - in asthma, 193
 - in dental caries, 192
 - in vasomotor rhinitis, 193
- Cancer**, 193
- etiology, 193
 - pathogenesis, 195
 - pathology, 197
 - cause of death, 199
 - prognosis, 199
 - treatment, 200
 - acidosis therapy in, 200, 203
 - autovaccination in, 202
 - calcium chloride in, 203
 - calcium lactate in, 203
 - diet in, 203
 - excision in, 44, 203
 - Gamma rays in, 201
 - lead therapy in, 202, 535
 - radium in, 44, 200-202
 - surgical therapy in, 200
 - x-ray in, 44, 201, 202
- of ampulla of Vater, **choledochoduodenostomy** in, 370
- of anus, **radium** in, 789
- of appendix, 101
- of bladder, see **Bladder tumors**, cancer of
- of cervix, see **Uterus cervical cancer**
- of esophagus, **radium** in, 785
- of gall-bladder, 166
- of genitourinary organs, **radium** in, 785
- of intestine, 505
- of jaw, upper, see **Jaw**, cancer of
- of kidney, 524
- of larynx, see **Larynx**, cancer of
- of lips, **surgical and radium therapy** in, 200
- of lungs, see **Lungs**, cancer of
- of mammary gland, see **Mammary gland**, cancer of
- of nasal cavity, **radium** in, 201, 789
- of oral cavity, **radium** in, 201, 789
- of ovaries, 651
- of palate, see **Palate**, cancer of
- of penis, see **Penis**, cancer of
- of pharynx, see **Pharynx**, cancer of
- of prostate, see **Prostate**, cancer of
- of rectum, see **Rectum**, cancer of
- Cancer** (*continued*)
- of respiratory tract, 789
 - of sigmoid, **abdomino-perineal excision** in, 279, 280
 - of skin, **surgical and radium therapy** in, 200
 - of stomach, see **Stomach carcinoma**
 - of testicle, 873
 - of tonsils, see **Tonsils**, cancer of
 - of uterus, see **Uterus**, cancer of
 - of uvula, see **Uvula**, malignant lesions of
- Carbon dioxide**, 65, 203
- in anesthesia, 203
- Carbon monoxide poisoning**, 204
- Carbuncle of kidney**, 516
- Carcinoma**, see **Cancer**
- Cardiovascular system**, 205
- general treatment, 262
 - digitalis** in, 262
 - depression of vomiting reflex, 263
 - quinidine** in, 262
 - resuscitation** in, 263
 - surgical approach in cardiac operations**, 264
 - syphilis**, 244
- Caries, dental**, see **Dental caries**
- Cataract**, 265
- etiology, 265
 - treatment, 266
 - nonsurgical, 266
 - suprarenin bitartrate** in, 266
 - surgical treatment**, 266
 - atropine** in, 267
 - Barraquer operation** in, 266
 - calcium** in, 266
 - Elschnig's forceps method** in, 266
 - epinephrine** in, 267
 - high frequency current** in, 267
 - intracapsular extraction** in, 266, 267
 - iridencleisis** in, 267
 - Knapp forceps method** in, 266
 - novocaine** in, 267
 - parathyroid hormone** in, 266
 - Smith Indian method** in, 266
 - tonometer** in, 267
 - viosterol** in, 266
 - senile, **Barraquer method** in, 268
 - paraphakine** in, 268
- Caudal anesthesia**, 74
- Cecum, high**, 364
- symptoms, 364
- low, 364
- symptoms, 364
 - treatment, 365
- Celiac disease**, **diet** in, 342

- Celiac disease (*continued*)
 iron in, 343
 viosterol in, 343
- Cellular angina, lymphoid, 172
- Central nervous system tumors, classification of, 179
- Cerebral, see also Brain
 birth palsies, 268
 muscle training in, 268
 physical therapy in, 268
 syphilis, 864
- Cerebrospinal fever, hydrocephalus in, see Hydrocephalus
- Cerebrospinal fluid, 685
 determination of protein, 685
- Cervical cancer, see Uterus, cervical cancer
 stricture, see Uterus, cervical stricture
- Cesarean section, 269
 local anesthesia in, 73
 contraindications, 269
 temporary exteriorization of uterus (Portes' operation), 270
 relation to maternal mortality, 601
- Chicken-pox, see Varicella
- Chloroform, administration, 65
 untoward effects, 65
 dextrose therapy in, 66
 sodium bicarbonate in, 66
- Chlorosis, diagnosis, 41
 iron in, 44
- Choked disc, 270
 drainage in, 270
- Cholecystectomy, effect of, 165
- Cholecystitis, van den Bergh test in, 545
 results and mortality in biliary surgery, 162, 163
 calculous, cholecystectomy in, 156
 drainage of bile duct in, 156
 gangrenous or purulent, bile salts in, 156
 cholecystectomy in, 163, 164
 cholecystostomy in, 163, 164
 dietary restriction in, 165
 oleic acid in, 165
 salines in, 165
 end-results of surgical treatment, 163
- Cholecystography, decholin-sodium in, 299
- Cholelithiasis, 146
 composition, 146
 pathogenesis, 147
 diagnosis of stones in common bile duct, 149
 without jaundice, 151
 painless jaundice, 151
 complications, 152
- Cholelithiasis, complications (*continued*)
 icterus, 152
 pancreatic insufficiency, 152
 treatment, 153
 indications for operations, 154
 preoperative, 153
 carbohydrates in, 154
 spinal anesthesia, 154
 anastomotic operations in, 158
 cholecystectomy in, 156, 157
 cholecystostomy in, 156
 choledochoduodenostomy in, 161
 graded surgery in, 156
 results of surgical treatment, 163
- Cholesterol metabolic function of liver, 547
- Chordotomy, controlled spinal anesthesia in, 85
- Chorea gravidarum, see Pregnancy complications
- Chorea minor, 270
 transmission, 270
 etiology, 270
 pathology, 271
 treatment, 271
 foreign protein injections in, 272
 nirvanol in, 271
 fatalities, 272
 results, 272
 spinal drainage, forced, in, 272
 streptococcic bacteriophage in, 272
 typhoid vaccine in, 272
- Chorioepithelioma, see Uterus chorioepithelioma
- Choroid, heteroplastic ossification of, 273
- Cinchophen poisoning, 273
- Cirrhosis of liver, diet in, 44
- Clinical pathology, 676
- Coagulation time of blood, Lee-White method of determination, 34
- Cold applications, 475
 sensitiveness, 28, 29
 histamine in, 28
 ice in, 29
- Colds, common, 273
 etiology, 274
 treatment, 275
 vaccines in prevention, 275
- Colectomy, 285
 indications and technic, 285
 in chronic ulcerative colitis, 285
 in polypoidosis, 285
- Colitis, chronic ulcerative, 276
 treatment, 276
- Colon, 275
 carcinoma, 276

Colon, carcinoma (*continued*)

- etiology, 278
- symptoms, 278
- diagnosis, 279
- treatment, 279
 - enterostomy in, 279
 - extirpation, surgical, in, 279
 - intraabdominal resection and anastomosis in, 279
 - vaccine, preliminary intraperitoneal, in, 279

irritable colon, chronic, 275

vaccine therapy in, 275

redundant, 364

symptoms, 364

treatment, 364

surgery of, 285

Commotio labyrinthi, 438

Conception, 286

Concussion of brain, 436, 440

Conjunctiva, 286

argyrosis, 286

sodium thiosulphate in, 286

blepharoconjunctivitis, 286

iodol in, 286

burns, 287

glycerite of tannic acid solution in, 287

meibomianitis, 287

etiology, 287

treatment, 287

massage in, 287

pigmentation, 287

etiology, 287

pterygium, 287

treatment, 287

electrocoagulation in, 287

excision of pterygium and transplantation of buccal mucosa in, 287

salvarsan in, 287

tuberculosis, 287

tumor, 287

Conjunctivitis, 287

acute, 287

boric acid irrigations in, 287

normal saline solution in, 287

angular, 288

zinc ionization in, 288

zinc sulphate in, 288

Parinaud's disease, 288

granular, 288

varieties, 288

etiology, 288

diagnosis, 289

treatment, 289

copper thiosulphate in, 290

Conjunctivitis, granular, treatment (*continued*)

epinephrine in, 290

iodine, tincture of, in, 289

massage in, 289

potassium iodide in, 290

silver iodide, nascent, in, 290

silver nitrate in, 290

trachosan in, 290

transplants in, 290

tuberculin therapy in, 290

ultraviolet rays in, 290

vernal, 290

complications, 290

etiology, 26

Contusion of brain, 436

Convulsions in children, 292

frequency, 292

etiology, 292

calcium, 292

hypoglycemia, 293

classification, 293

diagnosis, 295

prognosis, 296

treatment, 296

barbiturates in, 86

calcium gluconate in, 296

chloral in, 296

chloroform in, 296

dextrose in, 296

ether in, 296

lumbar drainage in, 296

luminal in, 296

magnesium sulphate in, 296

morphine in, 296

sodium chloride in, 296

viosterol in, 296

Cornea, 290

dystrophy, 290

treatment, 290

cyanide of mercury in, 290

ethyl morphine in, 290

phenacaine in, 290

infection, 291

ulcer hypopyon, 291

fistulization in, 291

iridectomy in, 291

ulcers, 291

gold chloride in, 291

ultraviolet rays in, 291

Corneoscleral cysts, 409

Coronary artery disease, 219

incidence, 219

in working classes, 220

occlusion, 224

- Coronary artery disease, occlusion (*continued*)
 diagnosis, 224
 pain in, 226
 pain in muscular ischemia, 225
 sclerosis, diagnosis, 222
 congenital medial, 223
 thrombosis, diagnosis, 222
- Corpus luteum, 86
 and estrin, interrelationship of, 390
- Cystadenoma of appendix, 101
- Cystic pneumatosis, 506
- Cystitis in pregnancy, 604
 silver nitrate solution in, 605
- Cystoscopy, caudal anesthesia in, 74
 nupercaine in, 74
- Cysts of eye, 409
 of mesentery, 597
 of orbit, 635
 of pleura, 730
- D**eaf-mutism, 296
 etiology, 297
 examination of, 297
 treatment, 296
 hearing device in, 298
 lip-reading in, 298
 special classes in, 298
 prophylaxis, 298
 elimination of underlying cause in, 298
- Deafness, 299
 status of hearing tests, 299
 phonograph speech test, 299
 tuning fork, 299
- Decholin-sodium (dehydrocholic acid preparation), 299
 in cholecystography, 299
- Deficiency diseases**, 300
 anemia, 303
 edema disease, 303
 malnutrition edema, 303
 osteomalacia, 302
 osteoporosis, 302
 protein deficiency, 303
 rickets, 302
 tetany, 303
 vitamine A deficiency, 301
 vitamine B deficiency, 302
 vitamine C deficiency, 302
- Dehydration, superficial, 383
- Delinquency**, (juvenile), 304
 treatment, 306
 child guidance clinic in, 306
 institutional care and training in, 305
- Dementia paralytica, see Syphilis neurosyphilis
- Dental caries, 307
 treatment, 307
 calcium in, 307
 phosphorus in, 307
 vitamine C in, 307
 vitamine D in, 307
- Dermatitis, 308
 etiology, 308
 arsphenamine dermatitis, 308
 dye, 308
 herpetiformis, x-rays in, 807
 seborrheicum, 308
 dieting in, 308
- Dermatoses, industrial, 309
 etiology, 309
 allergy, 309
 idiosyncrasy, 309
- Detachment of retina, 811
- "Deutschlander's disease," 425
- Diabetes mellitus**, 311
 incidence, 311
 pathogenesis, 312
 pathology, 315
 circulatory phases, 315
 symptomatology, 316
 complications, 317
 coma, 320
 pathological physiology, 320
 treatment, 322
 bed in, 322
 dextrose in, 322
 sodium bicarbonate in, 320
 warmth in, 322
 water freely in, 322
 gall-bladder and liver disorders, 317
 gangrene, 319
 symptoms, 319
 prophylaxis and treatment, 319
 antiseptic dressings in, 319
 heat in, 319
 insulin in, 319
 proper foot-wear and care of feet in, 319
 retinitis, 812
 thyrotoxicosis, 317
 treatment, 317, 344
 bile salt in, 318
 decholin in, 318
 denervation of adrenals in, 319
 diet, carbohydrate, in, 318
 high carbohydrate-low fat, 317, 334
 liver therapy in, 318
 myrtalin in, 318

- Diabetes mellitus, treatment (*continued*)
 phosphate mixture in, 318
 radiation of suprarenal region in, 319
 synthalin in, 318
- Diabetes mellitus in children, 323
 etiology, 323
 prognosis, 323
 treatment, 324
 diet in, 324
 fruits and vegetables in, 325
 high carbohydrate, in, 324
 high carbohydrate-low fat, in, 324, 325
 mixed, in, 325
 "normal diet" in, 324
 exercise in, 324
 insulin in, 324, 325
 treatment of coma, 326
 enemata in, 326
 gastric lavage, repeated, in, 326
 insulin in, 326
 salt solution, physiologic, in, 326
- Diaphragmatic hernia, see Hernia, diaphragmatic
- Diarrheal diseases in children, 326
 etiology, 326
 allergy, 328
 treatment, 328
 blood transfusions in, 329
 calcium therapy in, 327
 dextrose solution, weak, in, 328
 diet, apple, in, 329
 carbohydrate, in, 329
 egg yolk in, 329
 fresh fruit juices in, 329
 milk mixture in, 329
 rice gruel in, 329
 sugar in, 329
 fluids in, 328
 glucose in, 329
 oxygen in, 329
 Ringer's solution in, 329
 salt solution, normal, in, 328
 sugar solution in, 329
 water in, 329
- Diathermization of brain, 384
 Diathermy, 382
- Dietotherapy, 330
 diet, nutrition and infection, 330
 acid-base, 330
 in epilepsy, 330
 in nephritis, 330
 ketogenic, 336
 in chorea, 336
 in epilepsy, 336
- Dietotherapy, ketogenic diet (*continued*)
 in fat tolerance establishment, 337
 in migraine, 336
 in nausea prevention, 337
 in urinary infections, 336
 salt-free, 338
 in dermatoses, 338
 in lupus, 338
 in tuberculosis, 338
 in tuberculosis, surgical, 338
 food allergy, 338
 dietetics, 341
 in anemia, 341
 in arthritis, 342
 in celiac disease, 342
 in diabetes mellitus, 344
 in nephritis, 348
 in psoriasis, 349
- Digitalis, 350
 untoward effects, 351
 therapeutics, 352
 rectal digitalis therapy, 352
- Diphtheria, 352
 incidence and mortality, 352
 pathology, 353
 bacteriology, 354
 clinical aspects, 355
 complications, heart, 216
 treatment, 356
 antitoxin in, 356, 357
 aspiration in, 355
 dextrose in, 357
 glucose in, 357
 immunization in, 358
 diphtheria bacilli and toxin ointment in, 360
 toxoid in, 359, 360
 insulin in, 357
 serum in, 357
 complications, 357
 adrenalin in, 358
 tourniquet in, 358
 tracheotomy, low, in, 355
 malignant pharyngeal, 879
 diphtheria serum in, 879
- Diplopia, 411
- Dislocation of hip, congenital, 362
 treatment, 362
- Diverticula and diverticulitis, 489
 etiology, 489
 symptoms, 490
 diagnosis, 490
 differential diagnosis, 491
 treatment, 491
 diet in, 491

- Diverticula and diverticulitis, treatment
 (*continued*)
 gastroenterostomy in, 492
 surgical treatment in, 491
 Meckel's diverticulum in children, 492
 complications, 492
 of appendix, 103
 Drugs producing analgesia, 32
 Duodenum, 363
 adhesions of, congenital, 365
 anomalies of duodenum and colon, 363
 duodenal bands, 363
 symptoms, 364
 treatment, 364
 redundant colon, 364
 symptoms, 364
 treatment, 364
 high cecum, 364
 symptoms, 364
 low cecum, 364
 symptoms, 364
 treatment, 365
 injuries of, 2
 gastroenterostomy in, 2
 resection in, 2
 suture in, 2
 obstruction, 366
 congenital, 366
 etiology, 366
 symptoms, 367
 diagnosis, 367
 treatment, 367
 duodenojejunostomy in, 367, 368
 gastroenterostomy in, 367
 gastrojejunostomy in, 368
 liberation of cecal attachments in,
 368
 reduction of midgut volvulus in,
 368
 chronic, 368
 gastroduodenojejunostomy in, 368
 gastroenterostomy, anterior, in, 368
 intermittent, 368
 symptoms, 369
 treatment, 369
 tumors, 369
 diagnosis, 369
 of ampulla of Vater, 369
 symptoms, 370
 pathology, 370
 treatment, 370
 choledochoduodenostomy in, 370
 resection in, 370
 ulcer of, see Stomach, gastric and duo-
 denal ulcers.
- Dye dermatitis, 308
 Dyscrasias, blood, 169
 Dysmenorrhea, 370
 incidence, 370
 etiology, 371
 treatment, 371
 curettage in, 372
 dilatation in, 372
 estrin in, 372
 progesterin in, 371
 prolan in, 371
 theelin in, 371
 thyroid extract in, 372
- E**ar, 372
 anatomy and physiology, 372
 theories, 372
 complications in head injuries, 439
 malformations, congenital, 373
 syphilis of eighth nerve, 373
 tumors, malignant, 374
 electrodesiccation in, 374
 gold radon implants in, 374
 radium therapy in, 374
 x-ray therapy in, 374
 of acoustic nerve, 374
 internal, traumatic injuries of, 437
 pathogenesis and clinical aspects, 437
- Eclampsia, 374
 sequelæ, 374
 prophylaxis, 603
 treatment, 375
 atropine sulphate in, 376
 barbiturates in, 86
 chloral hydrate in, 377
 circulatory stimulants in, 376
 coramine in, 377
 dehydration in, 375
 dextrose solution in, 377
 diet in, 376
 fluid balance in, 375
 forceps in, 376
 glucose solution in, 376
 heart stimulant in, 377
 induction of labor in, 376
 magnesium sulphate in, 376, 377
 morphine sulphate in, 376, 377
 novatropin in, 376
 soapsuds enema in, 376
 sodium amytal in, 375, 376
 stomach lavage in, 376, 377
 thyroxine in, 377
- Ectopic gestation, 378
 diagnosis, 378
 differential diagnosis, 378

Ectopic gestation (*continued*)

- maternal mortality in, 603
- treatment, 379
 - bed in, 379
 - glycerin tampons in, 379
 - ice-bag to abdomen in, 379
 - ichthyol in, 379
 - operation in, 379, 603

Eczema, 379

- etiology, 379
 - exogenous causes, 379
 - patch test, 380
 - scratch test, 380
 - technic, 380
 - allergic skin diseases, explanation of, 381
 - Prausnitz-Kustner reaction, 381
- differential diagnosis, 27
- infantile, 381
 - etiology, 381
 - treatment, 382
 - milk-free diet in, 382
 - soy bean preparation in, 382

Edema disease, etiology, 303**Effusions**, pleural, 735**Electrocardiography**, 228

- deep Q wave in Lead III, 228
- duration of electrical systole of heart, 230

Electrotherapeutics and electrosurgery, 382

- coagulation current, 383
 - in larger tissue growth and bone involvement, 383
- cutting current, 383
- diathermy, 382
 - in arthritis, chronic, 385
 - in asthma, bronchial, 385
 - in chorea, 385
 - in dementia paralytica, 385
 - in gonorrhea, 385
 - in multiple sclerosis, 385
 - in thromboangitis obliterans, 385
- electrosurgery, in cancer, 384
 - cervical, 384
 - in endocervicitis, chronic, 384
 - in inoperable and radio-resistant lesions, 384
- infradiathermy, 384
 - in cutaneous ulcers, 384
 - in facial algia, 384
 - in pruritus, 384
 - in Raynaud's disease, 384
 - in sciatic algia, 384
 - in sympathetic algia, 384
- superficial dehydration, 383
 - in benign or malignant growths, 383

Electrotherapeutics, superficial dehydration (*continued*)

- in corneal and vocal cord growths, 383

Embolism of lung, 561**Encephalitis**, 385

- etiology and pathogenesis, 385
- pathology, 387
- differential diagnosis, 387
- treatment, 388
 - blood from patient recovering from herpes zoster in, 388

epidemic, 388

- pathology, 388
- symptoms, 388
- sequelæ, 389

treatment, 389

- acriflavine in, 389
- arsenicals in, 389
- barbiturates in, 389
- baths in, 389
- bulbocapnine in, 390
- colloidal metals in, 389
- dextrose in, 389
- endocrine therapy in, 390
- ephedrine in, 390
- hygiene, general, in, 390
- iodine preparations in, 389
- iron in, 390
- lumbar puncture in, 389
- malarial therapy, 389
- mercury in, 389
- occupational therapy in, 390
- physical therapy in, 390
- psychotherapy in, 390
- removal of foci of infection in, 390
- salicylates in, 389
- scopolamine in, 389
- sedatives in, 389
- serum in, 389
 - antistreptococcic in, 389
 - convalescent in, 389
 - Gay's hyperimmune rabbit, 389
 - Rosenow's, 389
- stramonium in, 389
- strychnine in, 390
- vaccines in, 389
 - Levaditi's herpes recovered rabbit brain vaccine, 389
 - Pfeiffer's, 389
 - Rosenow's, 389
 - Stewart's, 389

lead, see Lead encephalitis**otogenous**, 387**Encephalography in brain tumor**, 183**arterial**, technic, 183

- Encephalography, arterial (*continued*)
 phenobarbital as preoperative sedative, 183
- Encephalomyelitis, postvaccinal, 387
- Encephalopathy, chronic progressive vascular subcortical, 387
 toxic, of measles, 386
- Endamebiasis, acetarsone in, 10
- Endobronchial closed anesthesia, 70
- Endocarditis in children, 210
- Endocrine glands, interrelationship of, 390
 estrin and corpus luteum, 390
 hypophysis and ovaries, 390
 crime and, 771
- Endometriosis, 392
 pathogenesis, 392
 treatment, 393
 surgical methods in, 393
 x-rays in, 393
- Endoscopy, 393
 applied to air passages, 393
 bronchoscopy in children, 394
 in diagnosis of bronchiectasis, 396
 bronchostenosis, 394
 esophageal stenosis, congenital, 393
 esophagospasm, 398
 foreign bodies in lungs, 395
 pins, 395
 postoperative care, 395
 immediate supportive treatment, 395
 intrathoracic disease, diagnosis of, 395
 iodized poppyseed oil in, 395
 tumor diagnosis, 396
 of bronchi, benign tumors, 396
 of trachea, benign and primary malignant tumors, 396
- Endotheliomata of intestine, 505
 of palate, enucleation in, 790
 radium in, 790
 x-rays in, 790
- Enterocoele, vaginal, 953
- Enterocysts, 506
- Enuresis, 398
 definition, 398
 etiology, 398
 predisposing cause, 398
 specific cause, 399
 functional, 399
 organic, 399
 treatment, 400
 autosuggestion, positive, in, 400
 modified Goebell-Stockel muscle transplant operation in, 401
 placebo in, 400
- Enuresis, treatment (*continued*)
 suggestion, positive, in, 400
- Ephedrine, 401
 physiological effects, 401
- Epidemic encephalitis, 388
- Epidermolysis bullosa, 403
 cold baths in, 403
 viosterol in, 403
- Epididymis, teratoma of, 873
- Epilepsy, 403
 pathology, 403
 treatment, 403
 diets high in fat in, 405
 Swift operative method in, 403
- Epileptic attacks in brain tumor, 182
- Episcleritis, allergic, 27
 elimination of offending foods in, 27
- Epithelioma of anus, radium in, 789
 of neck, lead therapy in, 203
 of oropharynx, prognosis, 635
 of pharynx, operative treatment in, 637
 radiotherapy in, 638
- Ergosterol (irradiated), 405
 physiological effects, 405
 untoward effects, 406
 therapeutics, 406
 in osteomalacia with tetany, 406
 in osteoporosis, 406
- Erysipelas, 407
 acriflavine hydrochloride in, 407
 ultraviolet radiation in, 407
- Erythema nodosum, 408
 etiology, 408
- Esophageal stenosis, congenital, 393
 endoscopy in, 393
 symptoms, 394
 treatment, 394
 dilation of cardia in, 394
- Esophagospasm, 397
 endoscopy in, 398
 "physiologic bougienage" in, 398
 surgical treatment in, 398
- Esophagus, cancer of, gastrostomy in, 785
 radium in, 785
 foreign bodies in, perforations, mediastinotomy in prophylaxis, 394
 feeding via rubber tube inserted through nose in, 394
- Estrin, 87
 and corpus luteum, interrelationship of, 390
- Ether, 66
 endotracheal inhalation, 66
 technic, 66
 untoward effect, 66

- Ether, endotracheal inhalation, untoward effect (*continued*)
 - carbon dioxide in, 67
 - oxygen in, 67
 - raising the head in, 67
 - Ethyl chloride, 67
 - dangers, 67
 - Ethylene, 67
 - Ethylhydrocupreine, 408
 - untoward effects, 408
 - amblyopia, 408
 - Eugenic sterilization, 837
 - Exophthalmic goiter, see Graves's disease
 - Exophthalmos, 409
 - treatment, 409
 - compression, prolonged, of carotid artery in, 409
 - hypophysin in, 409
 - ligation of internal carotid in, 409
 - orbital decompression in, 409
 - pulsating, 409
 - treatment, 409
 - compression, gradual, of carotid artery in, 409
 - ligation in, 409
 - Extremities, arterial diseases of, 105
 - sarcoma of, lead therapy in, 203
 - Eye, 409
 - therapeutics, 413
 - anesthesia, 413
 - larocaine in, 414
 - percaine in, 414
 - tribromethanol (avertin) in, 413
 - diathermy, 414
 - physiological action, 414
 - epinephrine in, 414
 - action on pupil, 414
 - instillations, 414
 - cysts, 409
 - developmental defects, 409
 - diagnosis, 409
 - focal infection, 409
 - sinuses, 409
 - fundus, 410
 - anomalies, 410
 - differential diagnosis, 410
 - fusion, 410
 - reflex convergence, 410
 - hemorrhages, 410
 - treatment, 410
 - calcium chloride in, 410
 - ergot in, 410
 - heat in, 411
 - horse serum in, 411
 - ice compresses in, 410
 - Eye, hemorrhages, treatment (*continued*)
 - mydriasis in, 410
 - physical rest in, 410
 - Ringer's solution in, 411
 - saline solution in, 411
 - instruments, 411
 - eyelid everters, 411
 - lenses, 411
 - contact, 411
 - indications, 411
 - tinted, 411
 - muscles, 411
 - diplopia, 411
 - ocular fatigue, 411
 - orthoptic training, 412
 - paralysis, 412
 - ocular movements, 412
 - paralysis, 412, 413
 - of oculomotor nerve, 413
 - etiology, 413
 - treatment, 413
 - diathermy in, 413
 - of trochlear nerve, 413
 - etiology, 413
 - pneumococcus diseases, 413
 - serum therapy in, 413
 - tumors, 413
 - radium in, 413
 - removal with Shahan thermophore in, 413
- Eyeball, 414
 - anophthalmos, 414
 - diagnosis, 414
 - foreign body, 414
 - treatment, 415
 - cauterization of scleral wound in, 416
 - electromagnet in, 416
 - magnet in, 415
 - operation, 416
 - fixation of eyeball in, 416
 - tension, 416
- Eyelid, 416
 - blepharoconjunctivitis, 416
 - cerophthol in, 416
 - everters, 411
 - winking, 416
- Facial paralysis, 417
 - anatomy, 417
 - pathology, 417
 - surgical treatment, 418
 - muscle grafts in, 419
 - nerve anastomosis in, 418-420
 - nerve grafts in, 418
- Feeble-mindedness, 591

- Feeble-mindedness (*continued*)
 and delinquency, 304, 305
- Femoral hernia, see Hernia, femoral
- Fetal death, x-ray diagnosis of, 798
 mortality, 605
- Fibroma of intestine, 506
 of mesentery, 598
- Fibrosis of lung, 562
- Food allergy, 338
- Foot, march, 424
- Foreign bodies in bladder, 169
 in eyeball, 414
 in lung, 395, 562
 in respiratory passages, 395
 diagnosis of, 395
 postoperative care, 395
 immediate supportive treatment, 395
- Fractures, 420
 of calcaneum, 420
 treatment, 421
 open operation in, 421
 osteoperiosteal grafts in, 421
 of frontal sinus in skull fractures, 437
 of leg, 421
 skeletal traction in, 421
 of metacarpals and phalanges, 421
 Zuppinger-malleable volar splint in, 424
 of metatarsal bones, 424
 of patella, 425
 of skull, basal, 440
 diagnosis, 440
 pathological fractures, 425
- Frambesia and syphilis, relationship, 858
 vaccines in, 858
- Frontal sinusitis, 825
- Fundus, anomalies of, diagnosis, 410
- Funnel chest, heart in, 230
- Fusosporillosis, buccal, ulceronecrotic form, 879
- G**alactose tolerance test in jaundice, 511
- Gall-bladder, carcinoma of, 166
 cholecystoduodenostomy in, 160
 disease, indications for operation in, 154
 surgical treatment of, 154
 rupture of, 166
 cholecystogastrostomy in, 166
 stasis of, end-results of surgical treatment, 163
- Gastric ulcer, see Stomach gastric and duodenal ulcers
- Gastrointestinal injuries, 2
- Gastroptosis, see Stomach gastroptosis
- Gaucher's disease, 55, 833
- Gaucher's disease (*continued*)
 diagnosis, 55
 blood picture, 55
 prognosis, 57
- Gee's disease, see Steatorrhea, idiopathic
- Gelatin test in hepatic disorders, 549
- Genitourinary organs, cancer of, 785
 radium in, 785
 surgery, nupercaine in, 74
- Gestation, ectopic, see Ectopic gestation
- Gigantism, 426
- Glaucoma, 426
 diagnosis, 426
 treatment, 426
 alcohol injections in, 426
 calomel in, 426
 gynergen in, 426
 nervocidin in, 426
 novocaine in, 426
 surgical treatment, 426
 epinephrine solution preoperatively in, 427
 Holth's iridencleisis, modified, in, 427
 iridectomy in, 426
 pilocarpine in, 427
- Glioma of retina, 812
- Glomerulonephritis, acute diffuse, decapsulation in, 609
 nephrotomy in, 609
- Glossitis in blood dyscrasias, diagnosis, 173
- Glucose, 427
 untoward effects, 427
 absorption, 427
- Glycosuria, 428
 of pregnancy, 428, 765
 renal, 429
- Goiter, 429
 heart in, size and shape of, 257
 symptoms and signs of changes, 225
 treatment, x-rays in, 429
- Gold, 429
 untoward effects, 429
- Gonorrhea, 430
 complications, 430
 prophylaxis, 430, 431
 soap and water after exposure, 430
 soap emulsion (heavy) injections in, 430
 treatment, 430
 calcium gluconate in, 431
 diathermy in, 385
 drainage in, 431
 local injections in, 431
 oil of sandalwood (hot) injections in, 430

Gonorrhea, treatment (*continued*)
 pyridin in, 430
 silver iodide in, 431
 determination of cure, 431
 in the female, 431
 diagnosis, 432

Granulocytopenia, 432

treatment, 434
 blood transfusion in, 434
 irradiation in, 434
 nucleic acid in, 434
 radium in, 434
 x-rays in, 434

Granuloma of intestine, 505

inguinale, 435
 treatment, 435
 antimony in, 435
 antimony thioglycollamide in, 435
 potassium tartrate in, 435
 x-rays in, 435

Granulopenia, recurrent, 170

Graves's disease, cardiac histopathology in, 250

phenolsulphonphthalein test of kidney function in, 512

results of iodine administration, 507

Gynecologic abdominal operations, local anesthesia in, 71

Hay-fever, 22

etiology, 22
 symptoms and diagnosis, 22
 treatment, 23
 perennial type, 23
 palliative treatment, 23
 antiseptics in, 23
 ephedrine solutions in, 23
 oily preparations in, 23
 curative treatment, 23
 avoidance of offenders in, 23
 desensitization in, 23
 perennial method in, 25
 seasonal type, 23
 coseasonal treatment in, 25
 ephedrine in, 23
 greenhouse pollen in, 25
 pollen extract in, 23
 stock vaccine in, 23

Head injuries, 435

pathology, 435
 complications, 436
 ear (internal) lesions, 437
 pathogenesis and clinical aspects, 437
 treatment, cleansing of external ear, in, 439

Head injuries, ear complications, treatment (*continued*)

conservative treatment in, 439

iodine solution in, 439

mastoid dressing in, 439

frontal sinus fractures, 437

headaches, 439

hydrocephalic form, lumbar puncture in, 440

intermittent, localized variety related to change of posture, air injection in, 440

operation in, 440

"psychogenic" type, cerebral rest in, 440

removal of worries in, 440

mastoiditis, 436

meningitis, 436

osteomyelitis of skull, 437

traumatic neuroses, 436

diagnosis, 440

concussion, 440

basal skull fracture, 440

middle meningeal hemorrhage, 441

appraisal of head injuries, 441

medicolegal aspects, 441

Headache, 442

etiology and treatment, 442

removal of inferior sympathetic ganglion in, 442

allergic, 26

Heart, see also Cardiovascular system

in funnel chest, 230

traumatism, 259

rupture, 259

stab wounds, 260

surgical treatment, 265

Heart disease in children, 205

arrhythmias, 209

paroxysmal tachycardia, 209

auricular fibrillation, 210

prognosis, 210

treatment, 210

bed rest in, 210

digitalis in, 210

heart block, 210

cardiac complications of scarlet fever and diphtheria, 216

glucose solution in, 217

narcotics in, 217

rest in, 217

sedatives in, 217

congenital lesions, 207

diagnosis, 207

endocarditis, 210

- Heart disease in children (*continued*)
 functional murmurs, 205
 etiology, 205
 prognosis, 206
 differential diagnosis, 206
 rheumatic heart disease, 211
 incidence, 211
 pathology, 211
 etiology, 212
 diagnosis, 214
 treatment, 215
 bed rest in, 215
 streptococcus vaccine in, 216
 tonsillectomy in, 215
- Heat sensitiveness, 29
 ascending applications of heat in, 29
- Hemangioma of intestine, 506
 of kidney, 524
- Hematoma, chronic subdural, 448
 drainage in, 449
- Hematuria, 444
 in bilharziasis, endemic, 445
 in calculi, renal, diagnosis, 446
 vesical, 445
 in hypernephroma, 445, 446
 in papilloma, villous, of bladder, 445
 diagnosis, 446
 d'Arsonval high current in, 445
 in prostatic hypertrophy, 445
 in rupture of vessel, irrigations with
 saline or boric acid solution in, 445
 in tuberculosis, 445
 removal of kidney in, 446
 in tumors, 445
 malignant, cystectomy in, 445
 cystotomy in, 445
 removal of entire tumor with ful-
 guration of base in, 445
 in ureteral infarction, 445
 tumor, 445
 essential or idiopathic, diagnosis, 446
- Heminephrectomy, 525
 technic, 525
 indications, 525
 end-results, 526
- Hemolytic icterus, splenectomy in, 43
- Hemophilia, 446
 prophylaxis and treatment, 446
 graft of fresh human ovary in, 447
 ovarian extract in, 446
 case report, 447
 conclusions, 447
- Hemorrhage, 448
 acute, in anemia, acacia solution in, 43
- Hemorrhage, acute, in anemia (*continued*)
 stop bleeding in, 43
 transfusion in, 43
 chronic, in anemia, iron in, 43, 44
 stop bleeding in, 44
 cerebral hemorrhage, spontaneous, 450
 types, 450
 etiology, 451
 pathology, 452
 symptoms, 452
 diagnosis, 453
 laboratory observations, 454
 albuminuria and glycosuria, 455
 associated disease, 455
 blood, leukocytosis, 455
 fever, 455
 spinal fluid, 454
 treatment, 455
 aspiration of blood through trephine
 opening in, 457
 decompression in, 450
 ice-caps in, 457
 lumbar puncture in, 450, 454, 457
 removal of blood in cerebrospinal
 fluid and intracerebral and extra-
 cerebral clots in, 455
 removal of clots through craniotomy
 in, 457
 salicylates in, 457
 subarachnoid drainage in, 455
 meningeal, due to head injuries, 441
 of eye, see Eye, hemorrhages of
 of kidney, 520
 of stomach, see Stomach, hemorrhage
- Hemorrhagic diseases of newborn, 618
- Hepatitis, lactic acid test in, 546
- Hepatosplenomegaly, thorotrast in, 800
 in ankylosis, 800
 in enlargement of liver and spleen, 800
 in hydatid cyst, 800
 in leukemia, 800
 in pulmonary tuberculosis, 800
 untoward effects, adrenalin in, 800
 caffeine in, 800
 contraindications, 800
- Hernia, 457
 treatment of hernia, 462
 Bassini type of repair in, 464
 intraabdominal method of LaRoque,
 463
 plastic operation in, 464
 strips of fascia after Galli method in,
 464
 results of operative treatment, 464
 diaphragmatic, 458

- Hernia, diaphragmatic (*continued*)
types, 458
etiology, 459
symptoms, 459
femoral, intraabdominal method of LaRoque in, 463
results of operative treatment, 465
inguinal, alcohol (absolute) injections in, 462
intraabdominal method of LaRoque in, 463
orthophosphoric acid solution in, 462
traumatic, 457
etiology, 457
strangulated, 461
diagnosis, 461
treatment, early operation in, 462
intestinal resection, extensive, in, 462
interparietal, 458
abdomino-inguinal route of Moynihan in, 458
mesenteric, 460
diagnosis, 460
postoperative, 460
classification, 460
asthenia, 460
etiology, 460
prognosis, 460
treatment, 460
improvement of nutrition in, 460
secondary suture in, 460
mechanical hernia, 460
etiology, 460
predisposing factors, 460
prognosis, 460
treatment, freshening of wound edges in, 460
immediate secondary suture in, 460
suppurative, 460
etiology, 460
prognosis, 460
treatment, conservative treatment in, 460
subumbilical, postoperative, 464
plastic operation in, 464
vaginal, 953
Herpes zoster, 465
pituitary gland in, 465
posteruptive, neuralgia, x-rays in, 807
Hiccup, 465
classification, 465
treatment in general, 469
carbon dioxide in, 65
Hiccup, treatment in general (*continued*)
encephalitic antistreptococcus serum in, 469
gastric lavage in, 469
sedatives in, 469
soda water in, 469
indeterminate groups, 469
encephalitic antibody globulin solution in, 469
encephalitic antistreptococcic serum in, 469
phrenic nerve operation in, 469
infectious, persistent, 465
etiology, 465
pathology, 466
chemical, 467
etiology, 467
treatment, 467
albolene in, 468
barbital in, 468
Bland oil in, 467
cocaine in, 468
diet, soft, in, 468
emptying of stomach in, 467
enemas in, 467
ice cream in, 468
mineral oil in, 468
olive oil in, 468
sips of warm water in, 468
sodium bicarbonate in, 468
veronal in, 468
mechanical, 468
central form, 468
etiology and treatment, 468
cathartics, hypertonic, in, 468
enemas in, 468
glucose in, 468
hypertonic solutions in, 468
magnesium sulphate in, 468
spinal puncture in, 468
hysterical or psychic form, 469
treatment, 469
anesthesia in, 469
apomorphine in, 469
contrast baths in, 469
intubation in, 469
lavage in, 469
phrenicclasis in, 469
sedatives in, 469
peripheral form, 468
etiology, 468
treatment, 468
apomorphine in, 468
aspirin in, 468
belladonna in, 468

- Hiccup, mechanical, peripheral form, treatment (*continued*)
- blowing into bottle in, 468
 - drinking water while holding breath in, 468
 - flexing legs on thighs and thighs on abdomen in, 468
 - holding ice in mouth in, 468
 - ice compress on epigastrium in, 468
 - inspiring and holding breath in, 468
 - lemon juice and salt in, 468
 - lowering head and dilating anus in, 468
 - pressure on eyeball in, 468
 - over fifth cervical vertebra in, 468
 - sipping hot or cold water in, 468
 - sneezing in, 468
 - sodium bicarbonate solution in, 468
 - standing on hands or head in, 468
 - sudden shock in, 468
 - traction on tongue in, 468
 - vinegar and sugar in, 468
- due to aortic aneurism, phrenic nerve operation in, 469
- symptomatic treatment in, 469
- to tumors, removal of growth, 469
- postoperative form, 466
- treatment, 466
- allylisopropyl in, 467
 - aminopyrine in, 467
 - anesthesia, inhalation, in, 467
 - atropine in, 467
 - barbital in, 467
 - barbituric acid in, 467
 - bromides in, 467
 - camphorated tincture of opium in, 467
 - carbon dioxide and oxygen in, 467
 - chloral in, 467
 - chlorbutanol in, 467
 - chloroform in, 467
 - codeine in, 467
 - encephalitic antibody globulin solution in, 466
 - dermatitis complicating, calamine lotion in, 467
 - phenol in, 467
 - ether in, 467
 - morphine sulphate in, 467
 - oxygen in, 467
 - phenobarbital in, 467
 - phrenicclasis in, 466
 - phrenicotomy in, 466
 - quiet in, 467
 - quinine in, 467
- Hiccup, postoperative form, treatment (*continued*)
- rest in, 467
- Hip, congenital dislocation, 362
- treatment, 362
- Hirschsprung's disease (megacolon), 283
- etiology, 283
- treatment, 283
- parathormone in, 284
 - surgical treatment in, 284
- Histamine, 469
- physiological effects, 469
- untoward effects, 472
- ephedrine sulphate in, 472
 - pituitary extract in, 472
- Hodgkin's disease, anemia in, radium in, 43
- x-rays in, 43, 787
- Hot applications, 475
- Hydatid pneumothorax, 730
- Hydatiform mole, 473
- diagnosis, 473
- Aschheim-Zondek test in, 473
- Hydrocephalus, 473
- etiology, 473
- pathology, 473
- in cerebrospinal fever, 474
- types, 474
- prognosis, 474
- treatment, 474
- cisterna puncture in, 474
 - hospitalization in, 474
 - lumbar puncture in, 474
 - operation in, 474
 - specific therapy in, 474
 - theobromine sodiosalicylate in, 474
- Hydronephrosis, 519
- etiology, 519
- pathogenesis, 519
- diagnosis, 519
- intravenous urography in, 802
- treatment, 520
- in congenital solitary kidney, 516
- Hydrotherapy, 474
- Hyperinsulinism, 486
- Hypernephroma, 446
- Hyperosmia, 630
- Hyperpituitarism, 725
- Hypertension, arterial, potassium thiocyanate in, 873
- essential (primary), 231
 - analysis of clinical data, 232
 - analysis of pathological data, 235
- Hyperthyroidism, 248
- angina pectoris and, 254

Hyperthyroidism (*continued*)

- circulation, 248
 - heart changes, symptoms and signs of, 251
 - histopathology, 249
 - hypertrophy and congestive heart failure, 253
 - hepatic damage, 543
 - influence on electrocardiogram, 254
 - treatment, **quinine sulphate** in, 778
 - radiotherapy** in, 788
- Hypervitaminosis D**, 175
- cod-liver oil** in, 175
- Hypochromic anemia**, **iron** in, 44
- Hypoglycemia** in convulsions of children, 293
- Hypophysis**, see also **Pituitary gland** and **ovaries**, interrelationship of, 390
- Hypopituitarism**, 726
- Hypothyroidism**, **ergotamine** in, 256
- quinidine** in, 256

Icterus, hemolytic, **splenectomy** in, 43

- in newborn, 618

Idiocy, amaurotic family, 593

- etiology, 593
- pathology, 593
- treatment, 594

- Mongolian**, 591

Industrial dermatoses, 309**Ileomesenteric infarct**, 598**Infant feeding**, 476

- acid milk**, 480
- breast milk**, 476
- vs* **cow's milk**, 477
- complemental feeding of newborn**, 478
- copper** as prophylactic in artificial feeding, 478
- cow's milk**, 478
- evaporated milk**, 479
- irradiated milk**, 481

Infant mortality, 481

- mortality rate, 481
- cause, 481

Infantile paralysis, see **Poliomyelitis****Infarction**, ileomesenteric, 598

- of the lung, 561

Inguinal hernia, see **Hernia**, inguinal**Injuries of abdomen**, see **Abdominal Injuries**

- of the head, 435
- of heart, 259
- of skull, 435

Insulin, 483

- administration, 483

Insulin (*continued*)

- physiological action, 484
 - untoward effects, 484
 - anaphylactic reaction, 484
 - therapeutics, 485
 - in malnutrition in nondiabetics, 485
- hyperinsulinism**, 486
- case history, 486
 - laboratory investigation, 487
 - x-ray investigation, 487
 - diagnosis, 487
 - treatment, 487
 - adrenalin** in, 488
 - carbohydrate feedings** in, 486, 488
 - glucose** in, 488
 - pituitrin** in, 487

Intermittent claudication, **pancreatic extract** in, 228**Internal ear**, traumatic injuries of, 437**Interparietal hernia**, see **Hernia**, interparietal**Interrelationship of endocrine glands**, 390**Interrenalin**, preparation of extracts, 14**Intestinal parasites**, anemia due to, **anthelmintics** in, 43

- iron** in, 43

- sanitation** in, 43

Intestines, 488

- physiology, 488

- diagnosis, 488

diverticula and diverticulitis, 489

- Meckel's diverticulum** in children, 492

injuries of, 2

- artificial anus** in, 2

- resection** in, 2

intussusception, 494

- etiology, 494

- diagnosis, 495

- treatment, 496

- anastomosis, lateral**, in, 495

- antigangrene serum** in, 495

- colostomy** in, 496, 497

- disinvagination** in, 496

- excision of half of colon** in, 495

- exteriorization** in, 496

- fixation of colon** in, 496

- reduction, nonoperative**, in, 496

- abdominal exploration** in, 496

- air insufflation** in, 496

- pressure enemas** in, 496

- operative reduction** in, 496

- drainage of peritoneal cavity** in, 497

- evisceration of intestine into a moist**

- rubber dam bag kept warm by**

- hot compresses** in, 497

- Intestines, intussusception, treatment, operative reduction (*continued*)
- Mikulicz resection, modified, in, 497
 - sodium chloride physiological solution in, 497
 - resection in, 495, 496
- obstruction, 497
- classification, 497
 - etiology, 497
 - symptoms, 497
 - diagnosis, 498
 - mortality, 499
 - treatment, 499
 - bile in, 500
 - enterostomy in, 498
 - sodium chloride solution in, 500
- treatment of postoperative obstruction, 501
- anesthesia, spinal, in, 501
 - enterostomy in, 502,
 - irrigation of enterostomy tube in, 502-3
 - fluids in abundance in, 501
 - gastric lavage in, 501
 - heat to abdomen in, 501
 - inlying nasal catheter in, 501
 - psychical support in, 501
 - resection in, 502
 - salt solution in, 502
- surgery of, 506
- anastomosis, aseptic, 506
 - enterostomy as life-saving measure, 507
 - in malignant tumor, 507
 - in pelvic infection, 507
 - in peritonitis, 507
 - in ruptured duodenal ulcer, 507
 - in ruptured gall-bladder, 507
 - in septic appendix, 507
- tuberculosis, 503
- treatment, 503
- anastomosis in, 503
 - ileostomy, perineal, in, 503
 - prevention of skin irritation, 504
 - cleansing and drying of skin in, 504
 - compresses of dilute lead water in, 504
 - metallic copper powder in, 504
 - phenol in, 504
 - stearate of zinc powder in, 504
 - varnish of concentrated compound tincture of benzoin in, 504
 - resection in, 503
- tumors of small intestine, 505
- Intestines, tumors of small intestines (*continued*)
- aberrant pancreatic rest, 506
 - adenoma, 506
 - angiomas, 506
 - carcinomata, 505
 - cystic pneumatosis, 506
 - endotheliomata, 505
 - enterocysts, 506
 - fibromas, 506
 - granuloma, 505
 - hemangiomas, 506
 - lipomas, 506
 - lymphoblastoma, 505
 - lymphocytoma, malignant, 505
 - lymphoid tumors, 505
 - myomas, 506
 - neuroblastomas, 506
 - reticulum cell sarcoma, 505
 - sarcomata, 505
 - secondary, 506
- Intracranial diseases, x-ray diagnosis of, 798
- hemorrhage in newborn, 616
- Intrathoracic disease, endoscopy in, 395
- Intratracheal inhalation anesthesia, 70
- technic, 70
- Intussusception, see Intestines intussusception
- Involution psychoses, 771
- Iodine, 507
- physiological action, 507
 - in chronic lymphatic leukemia, 508
 - in exophthalmic goiter, 507
- Iris, innervation of, 508
- Jamaica ginger paralysis, 508
- etiology, 509
 - pathology, 509
- Jaundice, 509
- pathogenesis, 509
 - diagnosis, 509
 - blood cholesterol in, 548
 - galactose tolerance test, 511
 - lactic acid test in, 546
 - van den Bergh test in, 544
 - differential diagnosis of painless jaundice, 511
- obstructive, 161
- surgical treatment, 161
 - anastomosis in, 162
 - spinal anesthesia in, 162
 - transfusion of whole blood in, 162
 - complications, kidney failure, 162
 - glucose and salt solution in, 162
 - liver shock, adrenalin in, 162

- Jaundice, obstructive, surgical complications, liver shock (*continued*)
 glucose in, 162
 saline solution in, 162
 stimulants in, 162
- Jaw, cancer of, endothermy in, 790
 radium in, 790
 x-rays in, 790
- Juvenile delinquency, 304
- K**eratitis, phlyctenular, 291
 pathogenesis, 291
 etiology, 291
- Keratoplasty, 291
- Ketogenic diet, 336
- Kidney**, 512
 pathology, 512
 diagnostic measures, 512
 localization of suppuration, 512
 kidney function tests, 512
 phenosulphonphthalein test, 512
 urography, 513
 intravenous pyelography, 513
 source of error, 514
 untoward effects, 514
 indications, 515
 pyeloscopy, 515
 indications, 516
- anomalies, 516
 bilateral double ureters and double pelves, 516
 congenital solitary kidney, 516
 hydronephrosis in, 516
 drainage in, 516
 lateral anastomosis in, 516
 ectopic kidney, 516
 radical surgery in, 516
 horseshoe kidney, 517
 diagnosis, 517
 treatment, 517
 conservative surgery in, 517
 drainage in, 518
 heminephrectomy in, 517, 518
 indwelling ureteral catheters in, 518
 pelvic lavage in, 517
 pyelotomy in, 517
 removal of pathologic factors in, 518
 renal symphysiotomy in, 518
 treatment of renal infections in, 517
 unilateral renal agenesis, 516
- calculi, see Nephrolithiasis
- carbuncle, 518
 symptoms, 518
 diagnosis, 518
- Kidney, carbuncle** (*continued*)
 treatment, 518
 nephrectomy in, 518
 removal of involved kidney in, 518
 staphylococcal bacteriophage in, 513
- hemorrhage, 520
 nephrectomy in, 520
- hydronephrosis, 519
 etiology, 519
 pathogenesis, 519
 diagnosis, 519
 pyelography, 519
 treatment, 520
 pelvic lavage in, 520
 plastic operation in, 520
 ureteral dilatation in, 520
- injuries of, 3
 expectant treatment in, 3
 nephrectomy in, 3
- perinephritic abscess, 520
 etiology, 520
 symptoms, 520
 diagnosis, 520
- ptosis, 521
 differential diagnosis, 521
- renal surgery, 525
 heminephrectomy, 525
 technic, 525
 end-results, 526
 in hydronephrosis, 526
 nephrectomy, 526
 nephrostomy, 526
 in carcinoma of bladder, 527
 in hydronephrosis, 527
 in nephrolithiasis, 527
 in nerve lesions, 527
 in obstruction of lower ureter, 527
 in renal infections, 527
 sympathectomy, 527
- tuberculosis, 521
 pathology, 521
 diagnosis, 522
 treatment, 522
 electrocoagulation in, 523
 nephrectomy in, 446, 521, 522
- tumors, 523
 pathogenesis, 523
 pathology, 523
 diagnosis, 523
 prognosis, 523
 nephrectomy in, 523
- adenocarcinoma, 524
 nephrectomy in, 785
 x-ray, postoperatively, 785

Kidney tumors (*continued*)

- adenosarcomata, embryonal (Wilms tumor), nephrectomy in, 785
- radium in, 785
- x-rays in, 785
- carcinoma, 524
 - pathogenesis, 524
 - prognosis, 524
 - treatment, nephrectomy in, 524
- hemangioma, 524
- leiomyoma, 525
- sarcoma, 525
 - diagnosis, 525
 - prognosis, 525
 - treatment, removal of fatty tissue in, 525
 - x-rays in, 525

Labor, see Parturition

Labyrinthine lesions, 438

Labyrinthitis syphilitica tarda, 866

Lacrimal apparatus, 527

obstruction of duct, 527

removal of lacrimal sac in, 527

secretion, 528

tumor, 528

adenocarcinoma, 528

exenteration in, 528

Lactic acid test of liver function, 543

Lambliasis, see Parasites

Laparotomies, gynecologic, local anesthesia in, 71

Laryngitis and tracheitis, membranous (nondiphtheritic), 528

diagnosis, 529

treatment, drainage in, 529

tracheotomy in, 529

Larynx, 528

carcinoma, 530

treatment, 530

irradiation, postoperative, in, 531

laryngectomy in, 531

laryngofissure in, 531

radium in, 201, 789

"window" resection operation in, 531

hyperemia, chronic, voice hygiene in, 958

inflammation, chronic, voice hygiene in, 958

paralysis, 529

perichondritis, acute, of laryngeal cartilage, 528

drainage of marrow cavity in, 528

removal of sequestræ in, 528

stenosis, 528

skin grafting in, 528

Larynx, stenosis (*continued*)

surgical diathermy in, 528

tuberculosis, 529

diagnosis, x-ray, 529

prognosis, 530

treatment, 530

xanthoma multiplex, 531

treatment, 532

diet in, 532

insulin in, 532

pitressin nasal jelly in, 532

pituitary gland in, 532

tracheotomy in, 531

x-rays in, 532

Laurence-Biedl syndrome, 595

Lead, 532

encephalitis, diagnosis, 388

treatment, 388

calcium in, 388

dehydration in, 388

magnesium sulphate in, 388

viosterol in, 388

poisoning, 532

etiology, 532

lead within body, 532

symptomatology, 533

palsy, 533

encephalopathy, 533

diagnosis, 533

end-results, 534

treatment, 535

acid salts in, 535

calcium chlorate in, 535

diet low in calcium in, 535

therapeutics, 535

in cancer, 535

Leg, fracture of, 421

Leiomyoma of kidney, 525

Leiomyosarcoma of bladder, 169

Lens, luxation of, 536

cyclodialysis in, 536

extraction of lens in, 536

Lenses, contact, 411

indications, 411

tinted, 411

Leprosy, 536

prognosis, 536

treatment, 536

chaulmoogra oil in, 536

hot baths in, 537

olive oil with sulphuric acid in, 537

smallpox vaccine in, 537

Leukemia, 171

lymphatic, anemia of, radium in, 43

x-rays in, 43

Leukemia, lymphatic (*continued*)

chronic lymphatic, effect of Lugol's solution in, 508

myelogenous, anemia of, radium in, 43
x-rays in, 43

splenomyelogenous, x-ray diagnosis of, 800

Lichen planus, x-rays in, 804, 806, 807

irradiation of spine in, 537

Lichenification, etiology, 308

Limbic tumor, radium in, 413

removal in, 413

Linitis plastica, 852

Lipoid nephrosis in children, 612

Lipomata of intestine, 506

of mesentery, 598

Lips, cancer of, surgical and radium therapy in, 200

Liver, 537

carbohydrate function of, 548

clinical and pathological association with spleen, 537

circulation, 537

functions, 538

nonreticulo-endothelial diseases, 538

Banti's disease, 539

hemachromatosis, 539

hepatic cirrhosis and splenomegaly, 538

reticulo-endothelial diseases of liver and spleen, 539

hepatomegaly and splenomegaly, 539

etiology, 539

acute infections, 541

alcoholism, 541

amyloidosis, 541

cancer, 540

cirrhosis of liver, 541

endocarditis, subacute bacterial, 541

heart disease, 540

Hodgkin's disease, 541

leukemia, 541

septic conditions, 541

acute yellow atrophy, 542

etiology, 542

symptoms, 542

pathology, 543

diagnosis, 543

prognosis, 543

treatment, 543

diet in, 543

intravenous carbohydrates in, 543

purgation in, 543

sedation in, 543

Liver (*continued*)

cirrhosis, x-ray diagnosis of, 800

diet in, 44

cysts, x-ray diagnosis of, 800

in hyperthyroidism, 543

injuries of, 3

liver function tests, 544, 680

blood cholesterol, 547

in atrophic cirrhosis, 548

in cholecystitis, 548

in cholelithiasis, 548

in jaundice, 548

gelatin tolerance, 549

in cirrhosis, 549

in icterus catarrhalis gravis, 549

lactic acid, 545

in hepatitis, 546

in obstructive jaundice, 546

van den Bergh and bromsulphalein, 544
standard for, 680

in cholecystitis, 545

in hemolysis, 544

in obstructive jaundice, 544

Local anesthesia, 71

Lungs, 549

abscess, 549

etiology, 550

pathology, 551

symptoms, 552

complications, 552

diagnosis, 552

prognosis, 554

treatment, 554

argyrol in, 555

bacteriophage in, 555

bed-rest in, 555

bronchoscopy in, 555

drainage, postural, in, 555

surgical, in, 555

evacuation, bronchoscopic, in, 555

gomenol in, 555

intratracheal medication in, 555

leaving patient alone in, 555

lipiodol in, 555

lobectomy in, 555

phrenicectomy in, 555, 556

pneumothorax, artificial, in, 555, 556

rest in, 554

surgery, radical, in, 557

thoracoplasty in, 555

extrapleural, in, 557

thoracotomy in, 555

cancer, 558

etiology, 558

diagnosis, 559

- Lungs, cancer (*continued*)
 treatment, 561
 lobectomy in, 561
 radium in, 561
 x-ray in, 561
 embolism and infarction, 561
 incidence, 561
 fibrosis, 562
 pathogenesis, 562
 foreign body in, 395, 562
 diagnosis, endoscopy in, 395
 x-ray localization in, 562
 treatment, **peroral costophrenic bron-**
 choscopy in, 562
 postoperative care, 395
 immediate supportive care in, 395
 miliary disease, 563
 etiology, 563
 neoplasms, x-ray diagnosis of, 800
 postoperative complications, **carbon diox-**
 ide and oxygen in, 65
 silicosis, 563
 etiology, 563
 pathology, 563
 formation of silicotic islet of nonin-
 fective type, 566
 infective type, 567
 Lupus erythematosus, 571
 Lymphangioma, cystic, of nurslings, 598
 Lymphoblastoma of intestine, 505
 Lymphocytoma of intestine, 505
 Lymphoid cellular angina, 172
 tumors of intestines, 505
 Lymphosarcoma, anemia of, **radium** in, 43
 x-rays in, 43
- M**alaria, quinine sulphate in, 778
 anemia of, **sunlight** in, 43
 ultraviolet rays in, 43
- Malignant tumors, see Cancer
- Malnutrition edema, 303
- Malnutrition in children, 572
 metabolism, 573
 etiology, 573
 avitaminosis, 573
 vitamine A, 573
 vitamine B, 574
 vitamine B₂, 575
 vitamine C, 575
 vitamine D, 576
 vitamine E, 577
- Mammary gland, cancer of, diagnosis by
 x-ray, 797
 treatment, **lead therapy** in, 203
 radium in, 781
- Mammary gland, cancer, treatment (*con-*
tinued)
 gas anesthesia in, 782
 hyoscine in, 782
 morphine in, 782
 novocaine in, 782
 oxygen anesthesia in, 782
 advantages, 782
 disadvantages, 783
 x-rays in, 803
 cysts, x-ray diagnosis, 797
 metastatic involvement, x-ray diagnosis,
 797
 tumors, benign, x-ray diagnosis, 797
- March foot, 424
- Mastoiditis, acute, in otitis media, 647
 mastoid antrum to be opened and
 drained in, 644
 following head injuries, 436
- Maternal mortality in obstetrics, 599
- Maxillary sinus, 826
- Measles, 577
 pathology, 577
 complications, 576
 encephalitis, 386, 578
 encephalomyelitis, 578
 gangrene, 579
 myelitis, transverse, 578
 treatment, 579
 convalescent serum in, 579
 immune serum in, 579
- Meckel's diverticulum in children, see Di-
 verticula and diverticulitis
- Mediastinal tumor, removal of, endobron-
 chial closed anesthesia in, 70
- Megacolon, see Hirschsprung's disease
- Meibomianitis, 287
 etiology, 287
 treatment, 287
 massage in, 287
- Melanotic tumors of brain, 187
- Meningeal hemorrhage due to head injuries,
 441
- Meningioma, 182
- Meningitis, 579
 barbiturates in, 86
 due to head injuries, 436
 otitic, 580
 antibacterial remedies in, 581
 cisternal punctures in, 581
 decompression, temporal or subocci-
 pital, in, 581
 drainage in, 581
 evacuation of abscess in, 581
 lumbar punctures in, 581

- Meningitis, otitic** (*continued*)
 mastoidectomy in, 581
 radical exenteration of mastoid process in **chronic otitis**, 580
 removal of auricular focus in, 581
 removal of encysted fluid in, 581
 sinus opening in, 581
 spinal puncture in, 581
 ventricular puncture in, 581
 suppurative, of otitic and nasal origin, 723
 syphilitic, 580
 iodides in, 580
 mercury in, 580
 tuberculous, 580
 prognosis, 580
- Menopause**, 581
 pathology, 581
 differential diagnosis, 581
 complications, 582
 insanity, 582
 treatment, 582
 amniotin, 582
 hysterectomy in, 581, 582
- Menorrhagia**, 583
 etiology, 583
- Menstruation**, 583
 menstrual disorders, 583
 etiology, 583
 treatment, 584
 estrin in, 584
 vicarious menstruation, 584
 prognosis, 585
 treatment, 585
 aloe in, 585
 castration in, 585
 douches, hot vaginal, in, 585
 electricity in, 585
 exercises, sportive, in, 585
 hypophysis, anterior lobe, in, 585
 opotherapy in, 585
 ovarian hormone in, 585
 saline cathartics, strong, in, 585
 scarification of cervix in, 585
 surgical dilation of cervix in, 585
 thermal therapy in, 585
- Mental deficiency**, 585
 intelligence of immigrants, 585
 etiology, 586
 mortality, 488
 prophylaxis and treatment, 589
 musical program in, 591
 segregation in, 590
 sterilization in, 590
 training, 590
 amaurotic family idiocy, 593
- Mental deficiency, amaurotic family idiocy** (*continued*)
 etiology, 593
 pathology, 593
 treatment, 594
 juvenile form, 594
 feeble-mindedness, 591
 incidence, 591
 Laurence-Biedl syndrome, 595
 Mongolian idiocy, 591
 incidence, 591
 etiology, 592
 diagnosis, 593
- Mercury**, 596
 poisoning, treatment, 596
 cecostomy in, 596
 constant lavage in, 596
 sodium thiosulphate intravenously in, 596
- Mesentery**, 597
 cysts, 597
 chylous cysts, 597
 cystic lymphangioma in nurslings, 598
 symptoms, 598
 complications, 598
 diagnosis, 598
 treatment, 598
 extirpation in, 598
 marsupialization in, 598
 resection, partial, in, 598
 sanguineous cysts, 597
 serous cysts, 597
- hernia**, 460
infarction, 598
 enterectomy in, 599
injuries of, 3
tumors, 597
 pathogenesis, 597
 diagnosis, 597
 prognosis, 597
 fibromata, 598
 lipomata, 598
 malignant tumors, 598
- Metacarpals, fractures of**, 421
Metatarsal bones, fractures of, 424
- Migraine**, 442
 definition, 442
 etiology, 442
 treatment, 444
 correction of optic defect in, 444
 thyroid extract in, 444
 allergic, 25
 treatment, 26
 elimination in, 26

- Migraine, allergic, treatment (*continued*)
 restriction of food in, 26
 salines in, 26
 starvation in, 26
- Mole, hydatiform, 473
- Mongolian idiocy, 591
- Mononucleosis, infectious, 172
- Morphine addiction, 76
 butylbrompropenylbarbituric acid in, 76
 phenobarbital in, 76
 psychotherapy in, 76
 quartz lamp irradiation in, 76
 scopolamine in, 76
 sunbaths in, 76
 swimming in, 76
- Mortality, 599
 infant, 481
 in obstetrics, 599
 fetal mortality, 605
 abruptio placentæ, 605
 malpresentations, 605
 operative procedures, 605
 placenta previa, 605
 syphilis, 605
 toxemia of pregnancy, 605
 maternal mortality, 599
 one hundred maternal deaths, 603
 obstetric staff conferences, 602
 prenatal care to reduce maternal mortality, 602
 relation of open hospital, 601
 significance of birth registration, 601
 statistics, 602
 reduction of mortality from abortion, 602
 anesthesia, 603
 chloroform in, 603
 antepartum hemorrhage, 601
 Cesarean section in, 601
 distended rubber bag in, 601
 forceps in, 601
 pituitrin in, 601
 vaginal pack (tight) in, 601
 Cesarean section, 601
 craniotomy *vs* Cesarean section in neglected labor cases, 602
 eclampsia, 603
 ectopic pregnancy, 603
 hyperemesis gravidarum, 602
 pelvic contractions, borderline, 601
 podalic version, 602
 postpartum hemorrhage, 601
 prophylaxis, 601
 surgical procedures in pregnancy, 603
 appendicitis, 603
- Mortality in surgical procedures in pregnancy (*continued*)
 ectopic pregnancy, 603
 cervical fibroids, 603
 cervical cancer, 603
 radical removal of pregnant uterus in, 603
 radium in, 603
 x-ray in, 603
 ovarian tumors, 603
 treatment of labor, 603
 infection, 603
 toxemia, 603
 urinary tract infection, 604
 bacteriuria, 604
 cystitis, 604
 silver nitrate solution in, 605
 pyelitis, 604, 605
 antiseptic solution in, 604
 diet, liquid, in, 604
 fluids in abundance in, 604
 kidney lavage in, 604
 neosalvarsan in, 604
 rest in bed in, 604
 urethral catheterization in, 604
- Mucocele of appendix, 102
 appendectomy in, 102
- Multiple myeloma, 607
- Multiple sclerosis, 606
 etiology, 606
 prognosis, 606
 treatment, 606
 liver in, 606
 quinine hydrochloride in, 606
- Muscular ischemia, pain in, 225
- Myeloma, multiple, 607
 x-ray in, 607
- Myocardial degeneration, diagnosis, 222
- Myocarditis, syphilitic, 245
- Myomas of intestine, 506
- Myxedema, phenolsulphonphthalein test of
 kidney function in, 512
 anemia in, thyroid therapy in, 43
 heart, 258
 thyroid therapy in, 258, 259
- Myxosarcoma of bladder, 168
- Nasal cavity, cancer of, radium in, 201
 Nasopharyngeal tumors, radium in, 790
 x-rays in, 790
- Neck, epitheliomas of, lead therapy in, 203
- Nephrectomy, 526
- Nephritis, 607
 pathology, 607
 treatment, 608

- Nephritis, treatment** (*continued*)
 diet in, 348
 high protein, in Type I, 608
 low protein, in Type II, 608
 salt reduction in Type I, 608
 surgical treatment, 609
 water intake reduction in Type I, 608
 water to flush out waste products in Type II, 608
 chronic, 608
 treatment, alkaline salts in, 609
 diet, basic, in, 609
 hematuric, renal decapsulation in, 527
 massive hemorrhage, decapsulation, partial, in, 609
 nephrotomy in, 609
 nephralgia, decapsulation, partial, in, 609
 nephrotomy in, 609
 embolic focal purulent, drainage in, 609
 nephrectomy in, 609
Nephritis in children, 609
 etiology, 609
 diagnosis, 610
 function tests, 610
 treatment, 610
 diet, high protein, in, 610
 chronic, anemia in, 54
 hemorrhagic, 611
 etiology, 611
 treatment, 611
 calcium chloride in, 611
 forcing fluids by mouth in, 612
 magnesium sulphate in, 611, 612
Nephrolithiasis, 612
 etiology, 612
 symptoms, 613
 diagnosis, 613
 intravenous urography in, 802
 differential diagnosis, 613
 recurrence, 614
 treatment, 614
 cystoscopy in, 615
 drainage in, 614
 nephrectomy in, 614, 615
 nephrotomy in, 615
 pyelotomy in, 614, 615
Nephroptosis, 521
 differential diagnosis, 521
Nephrosclerosis, diet in, 348
Nephrosis in children, 612
 pathogenesis, 612
 lipoid, 612
Nephrostomy, 526
Neuroblastomata of intestines, 506
Neurocirculatory asthenia, 128
Neurodermatitis disseminatus, differential diagnosis, 27
Neurolabyrinthitis syphilitica, 866
Neurosphilis, see Syphilis neurosyphilis
Newborn, complementary feeding of, 478
 disorders of, 615
 asphyxia neonatorum, 618
 pathology, 618
 treatment, oxygen in, 619
 atelectasis, 619
 diagnosis, 619
 cerebral birth palsies, 268
 muscle training in, 268
 physical therapy in, 268
 duodenal obstruction, 366, 620
 duodenojejunostomy, posterior, in, 621
 freeing of cecal attachments in, 621
 gastrojejunostomy, posterior, in, 621
 reduction of midgut volvulus in, 621
 hemorrhagic diseases, 618
 pathogenesis, 618
 diagnosis, 618
 treatment, 618
 diet in, 618
 ultraviolet radiations in, 618
 viosterol in, 618
 icterus, 618
 pathogenesis, 618
 intracranial hemorrhage, 616
 pathogenesis, 616
 pathology, 616
 diagnosis, 617
 prophylaxis and treatment, 617
 blood, whole, injected into each buttock in, 617
 cisternal puncture in asphyxia, 617
 dextrose in, 617
 Drinker box-respirator in, 617
 gelatin in, 617
 magnesium sulphate in, 618
 milk (thick) feedings in, 617
 oxygen tent in, 617
 sodium amytal in, 618
 sodium chloride in, 617
 spinal drainage in, 618
 ophthalmia neonatorum, 620
 pemphigus neonatorum, 619
 prophylaxis, 620
 treatment, 620
 alcohol in, 620
 ammoniated mercury in, 620
 antiseptic ointments in, 620
 dusting powders in, 620
 gentian violet in, 620

- Newborn, pemphigus neonatorum, treatment (*continued*)
 lesions opened in, 620
 lotions in, 620
 ultraviolet irradiations in, 620
 prematurity, 615
 x-ray findings, 615
 treatment, 615
 breast milk in, 616
 calcium caseinate in, 616
 carbohydrates in, 616
 cod-liver oil in, 616
 diluted, unsweetened, evaporated milk in, 616
 feeding technic, simplified, 616
 rickets, congenital, 621
 diagnosis, 621
 tetany, 621
 etiology, 621
 diagnosis, 294
 treatment, calcium gluconate in, 621
 parathyroid extract in, 621
 thymus enlargement, 621
 Niemann-Pick's disease, 594
 Nitrites, 622
 physiological action, 622
 untoward effects, 622
 epinephrin in, 623
 Nitrous oxide anesthesia, 67
 morphine sulphate in, 68
 untoward effects, 68
 carbon dioxide in, 68
 Nose and nasal cavities, cancer of, radium in, 789, 790
 Nupercaine as a local anesthetic, 73
 in spinal anesthesia, 80
- O**besity, 623
 types, 623
 cerebral, 623
 constitutional, 624
 endocrine, 623, 625, 627
 endogenous, 623
 exogenous, 623
 hunger and satiety, 625
 pancreas, 623
 sex glands, 623, 625, 627
 thyrogenic, 623, 627
 diagnosis, 626
 prognosis, 627
 treatment, 627
 diet in, 627, 628
 prolan in, 628
 thyroid in, 628
 thyroxine in, 628
- Obstetrics, mortality in, 599
 Obstruction, intestinal, see Duodenum obstruction, also Intestines obstruction
 Occlusion of appendix, 102
 Occupational therapy, 629
 color and music, 629
 creative action, 629
 productive activity, 629
 self-assertion, 629
 self-confidence, 629
 Ocular fatigue, 411
 Oculomotor nerve paralysis, 413
 Olfactory disturbances, 630
 anosmia, 630
 cacosmia, 630
 hyperosmia, 630
 hyposmia, 630
 parosmia, 630
 synesthesia, 630
 tests, 631
 Bornstein's method, 631
 Omentum, 632
 hypertrophy, 632
 injuries of, 3
 spontaneous separation, 632
 removal of omentum in, 633
 torsion, 632
 tumors, 633
 Ophthalmia neonatorum, 620
 sympathetica, 634
 etiology, 634
 symptoms, 634
 Ophthalmoplegia, anterior internuclear, 412
 posterior internuclear, 412
 Optic nerve, 634
 atrophy, 634
 etiology, 634
 Oral cavity, cancer of, radium in, 201
 tumors of, endothermy in, 790
 radium in, 790
 Orbit, 634
 abscess, 634
 cysts, 635
 operations, 635
 novocaine solution in, 635
 Oropharynx, 635
 malignant tumors, 635
 prognosis, 635
 treatment, 636
 Coutard's method in, 636
 radium in, 636, 637, 638
 surgical treatment in, 636, 637
 teleradium in, 637
 x-ray in, 636

- Osteitis deformans (Paget's disease), 177
 high decalcifying diet in, 176
 fibrosa cystica, generalized (von Recklinghausen's disease), 176
 parathyroid and bone structure, 176
 treatment, 176
 removal of enlarged parathyroids in, 176
 tetany in, parathyroid extract in, 176
 x-ray in, 176
- Osteogenic sarcoma, radiation in, 178
- Osteomalacia, etiology, 302
 calcium in, 175
 vitamine D in, 175
 in pregnancy, see Pregnancy complications
- Osteomyelitis of skull, 437
- Osteoporosis, etiology, 302
- Otitic meningitis, 580
- Otitis media, adenoidectomy between attacks, 888
 acute, 628
 etiology, 638
 symptoms, 640
 complications, anemia, 54
 diagnosis, 642
 differential diagnosis, 644
 meningitis and meningism, 644
 treatment, 644
 adenoids curetted in, 644
 antrotomy in, 647
 end-results, 648
 curetting in, 644, 646
 dental caries treated in, 644
 eradication of infected bone in, 646
 heliotherapy in, 646
 iodine powder in, 646
 ionization with zinc sulphate in, 646
 mastoid antrum opened and drained in, 644, 645
 mastoidectomy, conservative, in, 646
 myringotomy in, 642
 nasal sinusitis, treated in, 644
 packing with bismuth-iodoform-paraffin paste gauze in, 646
 paracentesis in, 644, 645, 647
 scraping in, 646
 silver nitrate solution in, 646
 snaring of polyp in, 646
 tonsillectomy in, 644
 transantral attico-tympanotomy in, 647
 trephination in, 645
- Otogenous encephalitis, 387
- Otosclerosis, 648
 pathology, 648
- Ovaries, 649
 effect of myoma upon ovary, 649
 and hypophysis, interrelationship of, 390
 transplantation, 649
 solution of macerated ovaries in, 650
 tumors, 650
 symptomatology 651
 treatment, 651
 hysterectomy, supravaginal in, 651
 lead therapy in, 651
 panhysterectomy in, 651
 salpingo-oophorectomy, bilateral, in, 651
 in pregnancy, 603
 carcinoma, 651
 hysterectomy in, 652
 removal of ovaries in, 652
 granulosa-cell tumors, 652
 prognosis, 652
 treatment, irradiation in, 653
 operation in, 653
- Oxygen therapy, 653
 purpose, 653
 terminology, 653
 cyanosis as clinical test, 653
 physiology, 654
 metabolic action, 654
 ventilation equivalent, 654
 indications, 655
 in arthritis, chronic, 656
 in asphyxia, 655, 656
 of newborn, 655
 in asthma, 655
 in atelectasis, postoperative, 656
 of newborn, 656
 in bronchitis, 655
 in bronchopneumonia, 655, 656
 in burns, 656
 in carbon monoxide poisoning, 656
 in cardiac disease, 657
 decompensation, 655
 failure, 656
 coronary arteriosclerosis, 655
 coronary thrombosis, 656
 in diabetes mellitus, 656
 in epilepsy, 656
 in hypertension, 656
 in hyperthyroidism, 655, 657
 in influenza, 655
 in morphine poisoning, 656
 in neuropsychiatric affections, 655
 in pneumonia, lobar, 655, 656, 657
 in pulmonary fibrosis, chronic, 656

- Oxygen therapy, indications (*continued*)
 in sepsis, 656
 in surgical conditions, 657
 conclusions, 658
- Ozena, high frequency glass electrode spark
 in, 942
 ultraviolet therapy in, 942
- P**acks, 476
 in exophthalmic goiter, 476
 in insomnia, 476
 in palpitation, 476
- Paget's disease, 177
- Pain, barbiturates in, 86
 in muscular ischemia, 225
 pelvic, sympathectomy in, 687
- Palate, cancer of, electrocoagulation in, 790
 radium in, 201, 790
 x-rays in, 790
 endotheliomata of, enucleation in, 790
 radium in, 790
 x-rays in, 790
- Pancreas, 658
 physiology, 658
 carbohydrate metabolism, 658
 necrosis, 658
 tolerance determinations, 658
 influence of ligation of pancreatic ducts, 659
 injuries of, 3
 drainage in, 3
 partial removal in, 3
 suture in, 3
 rupture, 661
 diagnosis, 661
 treatment, 662
 calcium gluconate in, 662
 diet in, 662
 hydrochloric acid in, 663
 pankreon in, 662
 surgical treatment, 662
 takadiastase in, 662
 Witte's peptone in, 663
 xeroform in, 663
- Pancreatic rest, aberrant, 506
- Pancreatitis, acute, 659
 classification, 659
 etiology, 659
 diagnosis, 661
 treatment, 660
 drainage in, 660
 operation, early, in, 660
- Papilledema, 270
 drainage in, 270
- Papillomata of bladder, see Bladder, papillomata of
 of ureters, 942
- Paralysis, facial, see Facial paralysis
- Paralysis, Jamaica ginger, 508
 laryngeal, 529
 oculomotor, 412, 413
 trochlear nerve, 413
- Parasites, 663
 amebiasis, 30, 664
 nature of, 30
 incidence of infection, 30
 diagnosis, 31, 664
 pathology, 665
 pathogenicity, 31
 measures of control, 31
 treatment, 666
 dihydranol in, 666
 emetine hydrochloride in, 666
 glycerin in, 666
 magnesium sulphate in, 666
 yatren in, 666
 bothriocephalus anemia, 663
 diagnosis, 663
 lambliasis, 664
 diagnosis, 664
 treatment, 664
 arsenic in, 664
 drainage of bile ducts with chologogues and antiseptics in, 664
 emetine in, 664
 hydrochloric acid, dilute, in, 664
 lemonade in, 664
 systematic treatment of healthy carriers, 664
 protozoa, 663
 diagnosis, 663
 trichiniasis, 666
 diagnosis, 666
 prophylaxis, 667
 treatment, 667
 convalescent serum in, 667
 enemas in, 667
 purgation in, 667
- Parathyroidism, experimental, 667
- Parinaud's disease, 288
 etiology, 288
- Parosmia, 630
- Parturition, 668
 labor pains, 668
 physiology, 668
 posterior pituitary gland in, 668
 mortality in, 599
 maternal, 599
 in abortion, 602

Parturition, maternal mortality (*continued*)
 in abruptio placentæ, 601
 in antepartum hemorrhage, 601
 in Cesarean section, 601
 in craniotomy *vs* Cesarean section in
 neglected labor cases, 602
 in hyperemesis gravidarum, 602
 in podalic version, 602
 in postpartum hemorrhage, 601
 in urinary tract infections, 604
 prenatal care in reduction of, 602
 fetal mortality in, 605
 in abruptio placentæ, 605
 in malpresentations, 605
 in operative procedures, 605
 in placenta previa, 605
 in syphilis, 605
 in toxemia of pregnancy, 605
 disorders of, 669
 antepartum hemorrhage, Cesarean sec-
 tion in, 601
 distended rubber bag in, 601
 forceps in, 601
 pituitrin in, 601
 vaginal pack (tight) in, 601
 breech presentation, 671
 dystocia dyspitiuitarism, 669
 eclampsia, prophylaxis, 603
 infections, 603
 placenta previa, 670
 treatment, 670
 blood transfusion in, 670
 insertion of bag extraovularly in,
 670
 iodoform gauze packing in, 670
 ligation (bilateral) of uterine ves-
 sels through vaginal wall in, 670
 short umbilical cord, 672
 toxemia, 603
 treatment, 672
 anesthesia in, 673
 amytal in, 73, 673, 674
 chloroform in, 66, 603
 ether-oil rectally in, 674
 local, in, 73
 morphine in, 73
 scopolamine in, 73, 674
 Cesarean section, 269
 forceps in, 675
 induction of labor at term, 673
 castor oil in, 673
 pituitary extract in, 673
 quinine in, 673
 rupturing membranes in, 673
 pituitary extract in, 672

Parturition, treatment (*continued*)
 thymophysin in, 672
 Patella, fractures of, 425
 Pathological fractures, 425
 Pathology, clinical, 676
 bacteriology, 676
 blood examination, 683
 cerebrospinal fluid, 685
 liver tests, 680
 tissues, 680
 rapid digestion of biological material,
 680
 procedure, 680
 demonstration of copper, 682
 technic, 682
 determination of arsenic, 682
 method, 682
 procedure, 683
 urinalysis, 686
 Pelvic pain, 687
 sympathectomy in, 687
 technic, 687
 Pemphigus, chronic, 688
 local and supportive measures in, 688
 viosterol in, 688
 neonatorum, see Newborn, disorders of
 Penis, anomaly of, 688
 cancer of, amputation in, 786
 radium in, 786
 radon plaque in, 786
 Peptic ulcer, 689
 general considerations, 689
 mortality, 689
 etiology, 689, 692
 diet, 696
 environment and constitution, 692
 anthropomorphic studies, 693
 genetic studies, 693
 gastric secretion, 695
 neurogenic factor, 697
 symptoms, 689, 699
 pain, 699
 complications, 690, 700
 alkalosis, 700
 calcium carbonate in, 700, 701
 magnesium oxide in, 701
 Sippy plan in, 701
 sodium bicarbonate in, 700, 701
 diagnosis, 701
 prognosis, 703
 treatment, 690, 706
 gastric mucin in, 692, 706
 Sippy plan in, 692
 vaccines in, 692
 x-rays in, 709

- Peptic ulcer, treatment (*continued*)
 surgical, 690
 gastrectomy in, 692, 709
 gastroenterostomy in, 692, 709
 pyloroplasty in, 709
 resection in, 692
 Pericarditis, 238
 adherent, 238
 etiology, 238
 diagnosis, 239
 treatment, operative, 240
 pyopericarditis, 243
 treatment, 243
 pericardiectomy in, 243
 with effusion, 242
 treatment, 242
 cardiolysis in, 243
 pneumopericardium in, 242
 Pericholecystitis, adhesive, without calculi,
 end-results of surgical treatment, 163
 Perichondritis, acute, of laryngeal cartilage, 528
 drainage of marrow cavity in, 528
 removal of sequestræ in, 528
 Peridural anesthesia, 84
 Perinephritic abscess, 520
 etiology, 520
 symptoms, 520
 diagnosis, 520
 Perinephritis, renal decapsulation in, 527
 Perineum operations, spinal anesthesia in, 83
 Peritonitis, 710
 etiology, 710
 pathology, 711
 neurogenic factors, 711
 varieties, 712
 meconium, 713
 migratory, 714
 pneumococcus, 712
 etiology, 712
 symptomatology and diagnosis, 712
 mortality, 713
 treatment, 713
 drainage in, 713
 early operation in, 713
 incision, bilateral, in, 713
 laparotomy in, 713
 removal of appendix in, 713
 renal, 714
 rheumatic, 714
 complications, 715
 adhesions, 716
 papain solutions in, 716, 717
 Peritonitis, complications, adhesions (*continued*)
 sodium chloride physiological solution in, 716
 trypsin in, 716
 gangrene, 715
 subphrenic abscess, 715
 early drainage in, 716
 operation by subperitoneal route in, 716
 by transdiaphragmatic route in, 716
 by transpleural route in, 716
 prophylaxis, 717
 colon bacilli intraperitoneal injections in, 717
 treatment, 717
 atropine in, 717
 avoidance of unnecessary trauma in, 717
 drainage in, 717
 gastric lavage in, 717
 gum acacia in, 717
 ileostomy, primary, in, 718
 morphine in, 717
 raw meat juice in, 717
 saline solution (normal) in, 717
 suture of perforated ulcer in, 711
 Perlèche, 718
 Pernicious anemia, see Anemia, pernicious
 Addisonian, etiology, 35
 Petrositis, 720
 symptomatology, 721
 complications, 724
 treatment, 723
 surgical treatment in, 723
 Pertussis, see Whooping cough
 Phalanges, fractures of, 421
 Pharyngeal diphtheria, malignant, 879
 diphtheria serum in, 879
 Pharynx, tumors of, prognosis, 635
 carcinoma, Coutard x-ray therapy in, 636
 electrocoagulation in, 790
 radium in, 637
 radium needles in, 790
 epitheliomas, operative treatment in, 637
 radium in, 637
 Phenolsulphonphthalein test, 512
 Phlebarteriectasis, 724
 diagnosis, 724
 Physical allergy, 28
 cold sensitiveness, 28, 29
 histamine in, 28
 ice in, 29
 heat sensitiveness, 29

- Physical allergy, heat sensitiveness (*continued*)
 ascending applications of heat in, 29
- Pigmentation of conjunctiva, 287
 etiology, 287
- Pituitary gland, 725
 hyperpituitarism, 725
 hypopituitarism, 726
 symptoms, 726
 treatment of juvenile type, 726
 growth hormone in, 726
 organotherapy, 87
 tumors, 727
 adenomata, 727
 surgical treatment of, 727
 novocaine solution in, 727
 basophil adenomata (basophilism), 728
 diagnosis, 728
- Placenta previa, 670
- Plaut-Vincent's infection, 879
 bismuth in, 879
- Pleura, diseases of, 729
 adhesions, 729
 cysts, 730
 hydatid pneumothorax, 730
 case report, 730
 diagnosis, 734
 treatment, 734
 Dakin's solution in, 734
 decortication in, 734
 ether in, 734
 evacuation of contents in, 734
 formalin solution in, 734
 plastic operations in, 734
 rib resections, extensive, in, 734
 effusion, 735
 diagnosis, 735
 pathological physiology, 737
 treatment, 738
 aspiration of fluid in, 739
 air replacement in, 739
 gas replacement in, 738
 slow withdrawal of fluid in, 738
 infections, 735
 fusospirochetosis, 735
- Pneumocardiac tamponade, 261
- Pneumonia, 739
 etiology, 739
 pathogenesis, 739
 pathology, 739
 symptoms, 740
 treatment, 741
 laboratory methods, 741
 direct method of typing pneumococci, 741
- Pneumonia, treatment, laboratory methods (*continued*)
 rapid method of typing pneumococci, 679
 artificial pneumothorax in, 743
 asepsis in, 743
 diaphoretic in, 744
 Felton's serum in, 744
 morphine in, 743
 procaine hydrochloride in, 743
 warm sponging in, 744
 carbon dioxide in, 657
 ethylhydrocupreme hydrochloride, value of, 778
 oxygen in, 657
 quinine hydrochloride, value of, 778
- Pneumonia in children, 744
 complications, anemia, 54
 treatment, 746
 artificial pneumothorax in, 740
 cough, codeine in, 746
 morphine in, 746
- Pneumococcus diseases of eye, 413
 serum therapy in, 413
- Polomyelitis, (infantile paralysis), 746
 epidemiology, 747
 etiology, 747
 predisposing causes, 747
 specific causes, 748
 incubation period, 750
 central nervous system, 751
 signs, 752
 paralytic period, 752
 systemic stage, 750
 laboratory findings, 754
 blood, 754
 cerebrospinal fluid, 754
 globulin, 755
 nature of disease, 746
 portal of entry, 749
 transmission, 749
 types, 752
 abortive form, 752
 bulbar type, 753
 treatment, 755
 therapeutic, 755
 serum in, 755
 convalescent serum in, 755
 value of, 755
 time of injection, 756
 method of injection, 756
 dose, 757
 Rosenow's serum in, 757
 antiviral goat's serum in, 757
 spinal drainage (forced) in, 758

- Poliomyelitis, treatment, therapeutic (continued)**
- sodium chloride hypotonic solution in, 758
 - treatment of hyperesthesia, 758
 - absolute rest in, 758
 - x-ray in, 758
 - of respiratory disturbances, 758
 - aspiration of throat in, 758
 - avoidance of vomiting in, 758
 - Drinker respirator in, 758
 - parenteral fluids in, 758
 - postural drainage in, 758
 - tracheotomy in, 758
 - orthopedic, 758
 - apparatus in, 759
 - braces in, 759
 - electricity in, 759
 - heat in, 759
 - heliotherapy in, 759
 - hydrotherapy in, 759
 - massage in, 759
 - muscle training in, 759
 - operative procedures in, 759
 - plaster in, 759
 - rest in, 759
- Polyp of ureters, 942**
- Postanginal sepsis, 880**
- Postoperative hernia, see Hernia, postoperative**
- Posttonsillitic pyemia, 880**
- septicemia, surgical intervention in, 882
 - ligation of jugular vein in, 882
 - thrombophlebitic sepsis, 880
- Postvaccinal encephalomyelitis, 387**
- Potassium thiocyanate, physiological action, 874**
- untoward effects, 874
- Pregnancy, 759**
- diagnostic tests, 759
 - Aschheim-Zondek reaction, 760
 - modified test, 761
 - bladder epinephrine probe test, 759
 - technic, 760
 - complications, 762
 - anemias, 762
 - prognosis, 762
 - treatment, diet rich in nuclear material in, 43
 - iron in, 762
 - liver in, 43, 762
 - transfusion in, 762
 - anemia, pernicious, 762
 - treatment, desiccated hog's stomach in, 763
 - Pregnancy, complications, anemia pernicious, treatment (*continued*)
 - ferric ammonium citrate in, 763
 - ferric citrate in, 763
 - appendicitis in, 98, 603
 - surgical intervention in, 100, 603
 - bacteriuria, 604, 763
 - cervical cancer, 603
 - radical removal of pregnant uterus in, 603
 - radium in, 603
 - x-ray in, 603
 - fibroids, 603
 - chorea gravidarum, 764
 - prognosis, 764
 - treatment, 764
 - careful feeding in, 764
 - gentle discipline in, 764
 - induction of premature labor or abortion in, 764, 765
 - morphine in, 764
 - nerve sedatives in, 764
 - rest in, 764
 - seclusion in, 764
 - cystitis, 604
 - silver nitrate solution in, 605
 - fetal death, x-ray diagnosis of, 798
 - glycosuria, 428, 765
 - osteomalacia, 765
 - treatment, 765
 - calcium in, 765
 - cod-liver oil in, 765
 - fresh vegetables and fruits in, 765
 - milk and butter in, 765
 - phosphorus in, 765
 - ovarian tumors, 603
 - pyelitis, 604, 605
 - antiseptic solution in, 604
 - diet, liquid, in, 604
 - fluids in abundance in, 604
 - kidney lavage in, 604
 - neosalvarsan in, 604
 - rest in bed in, 604
 - urethral catheterization in, 604
 - surgical procedures in, 603
 - toxemias, 765
 - diagnosis, 766
 - urinary tract infections, 604
 - ectopic gestation, see Ectopic gestation
 - pseudopregnancy, 761
 - Prematurity, see Newborn, disorders of
 - Prostate gland, 766**
 - cancer of, removal of obstruction in, 786
 - radon-bearing needles in, 786
 - radon implants in, 786, 787

Prostate gland, cancer of (*continued*)
 gold seeds in, 786
 prostatitis, chronic, 766
 etiology, 766
 treatment, 766
 hot rectal irrigations in, 767
 sclerosis, 767
 suprapubic resection with rongeur in, 767
 Prostatectomy, 767
 technic, 767
 perineal, sacral block anesthesia in, 74
 Prostatic resection, revision, and so-called transurethral prostatectomy, 767
 technic, 768
 comprex oscillator current in, 767
 Davis-Bovie electrosurgical unit in, 767
 Stern-McCarthy electrotome in, 767
 Stern rectoscope in, 767
 indications, in hypertrophies, 770
 in malignancies, 770
 in simple fibrosis, 770
 Protein deficiency disease, 303
 Protozoa, diagnosis, 663
 Pruritus, etiology, 308
 potassium in, 770
 Pseudomyxoma of appendix, 101
 Pseudopellagra, alcoholic, 14
 Pseudopregnancy, 761
 Psoriasis, 770
 treatment, 770
 diet in, 349
 protein therapy in, 770
 Psychiatry, 771
 crime and endocrine glands, 771
 Psychoses, involution, 771
 treatment, 772
 amniotin in, 772
 induced narcosis and fever therapy in, 773
 ovarian hormone in, 772
 phenobarbital sodium in, 773
 typhoid vaccine in, 773
 Pterygium, 287
 treatment, 287
 electrocoagulation, 287
 excision of pterygium and transplantation of buccal mucosa in, 287
 salvarsan in, 287
 Puerperal eclampsia, see Eclampsia
 scarlet fever, 819
 Pulmonary tuberculosis, see Tuberculosis, pulmonary
 Pyelitis, 773

Pyelitis (*continued*)
 treatment, 773
 free diuresis in, 773
 indwelling catheter in, 773
 pelvic lavage in, 773
 rest in bed in, 773
 ureteral lavage in, 773
 treatment of obstructive ureteral lesions, dilatation (gradual) of ureters, 773
 hexamine in, 773
 hexylresorcinol in, 773
 in pregnancy, see Pregnancy complications
 Pyelitis in children, 773
 definition, 773
 etiology, 773
 predisposing causes, 773
 specific cause, 774
 pathology, 774
 route of invasion, 775
 diagnosis, 776
 prognosis, 776
 treatment, 776
 Pyelography, intravenous, 513
 diagnostic value, 513
 source of error, 514
 contraindications, 514, 515
 untoward effects, 514
 indications, 515
 in floating kidney, 515
 in glomerulonephritis, 514
 in hemorrhagic nephritis, 514
 in hydronephrosis, 515
 in renal lithiasis, 515
 in renal tuberculosis, 513
 in ureteral dilatation, 515
 in ureteral regurgitation, 515
 retrograde, in chronic pyelonephritis, 515
 in renal tuberculosis, 515
 Pyeloscopy, 515
 indications, 516
 in hydronephrosis, 515
 in neoplasms, 515, 516
 in ptosis, 516
 in ureteral conditions, 516
 Pyopericarditis, pericardiectomy in, 243
 Pyorrhea alveolaris, 776
 dietetic treatment, 776
 Pyridium, 777
 physiological action, 777
 Quinine, 777
 untoward effects, 777
 therapy, 778

Quinine, therapy (*continued*)

- in hyperthyroidism, 778
- in malaria, 778
- in pneumonia, 778

Radium, 779

- introduction, 779
- law of Bergonie and Tribondeau, 780
- therapeutic uses, 781
 - actinomycosis, 781
 - adenosarcomata of kidney (Wilms tumor), 785
- cancer of anus, squamous cell, 789
 - of bladder, 786, 787
 - of breast, 781
 - gas anesthesia in, 782
 - hyoscine in, 782
 - morphine in, 782
 - novocaine in, 782
 - oxygen anesthesia in, 782
 - advantages, 782
 - disadvantages, 783
- of esophagus, 785
- of genitourinary organs, 785
- of jaw, upper, 790
- of larynx, 789
- of nose, 789
- of palate, soft, 790
- of penis, 786
- of pharynx, 790
- of prostate, 786
- of rectum, 786
- of respiratory tract, 789
- of tonsils, 790
- of uterus, 792
 - metastases, 793
- of uvula, 790
- endothelioma of palate, 790
- epithelioma of anus, 789
- Hodgkin's disease, 787
- hyperthyroidism, 788
- papillomata of bladder, 785
- teratoma of testis, 786
- tumors of nasal accessory sinuses, 789
 - of nasal cavities, 790
 - of nasopharynx, 790
 - of oral cavities, 790

Radon, see Radium

Raynaud's disease, 807

- pathogenesis, 807
- symptoms, 809
- diagnosis, 809
- treatment, 810
 - calcium gluconate in, 810
 - calcium lactate in, 810

Raynaud's disease, treatment (*continued*)

- ganglionectomy, lumbar sympathetic, in, 808
- high-calcium-high-vitamine régime in, 810
- lactose in, 810
- milk in, 810
- neurectomy, sympathetic, in, 811
- orange juice in, 810
- tomato juice in, 810
- viosterol in, 810
- Rectum, cancer of, abdomino-perineal excision in, 279, 280
 - technic, 280
- radium in, 788, 789
- radon in, 788
- surgery in, 279, 788, 789
- x-ray in, 789
- Renal glycosuria, 429
- rickets, 178
 - kidney and bone structure in, 178
- Respiratory tract, upper, cancer of, 789
 - radium in, 789
- Reticulo-endothelial diseases of liver and spleen, 539
- Retina, 811
 - detachment, 811
 - etiology, 811
 - prognosis, 811
 - treatment, 812
 - Gonin operation in, 812
 - rest in bed in, 811
 - diabetes and retinitis, 812
 - glioma, 812
- Rheumatic fever, acute, encephalitis in, 386
- heart disease in children, see Heart disease in children
- Rhinitis, chronic, calcium in, 942
 - light therapy in, 942
 - thyroid gland in, 942
 - ultraviolet light, water-cooled, in, 942
- hyperesthetic, calcium in, 942
 - light therapy in, 942
 - thyroid gland in, 942
- Rickets, 174
 - etiology, 302
 - prevention, 174
 - cod-liver oil in, 175
 - irradiated milk in, 481
 - treatment, cod-liver oil in, 175
 - irradiated ergosterol in, 175
 - irradiated milk in, 481
 - osteotomy in, 175
 - vitamine D in, 175
- congenital, 621

Rickets, congenital (*continued*)
 diagnosis, 621
 renal, 178
 kidney and bone structure, 178
 Rupture of bladder, 169

Sacral block anesthesia, 74

 Salt-free diet, 338

Salyrgan, 812

 untoward effects, 812

 therapeutics, 814

 in ascites, 814

 in cancer, 814

 in cirrhosis of liver, 814

 in effusions, malignant, 814

 in heart failure, 814

 in nephrosis, 814

 in ovarian cyst, 814

Sarcoma of appendix, 101

 of extremities, lead therapy in, 203

 of intestine, 505

 reticulum cell of, 505

 of kidney, 525

 of uterus, see Uterus, sarcoma of

Sarcosarcoma of bladder, 169

Scarlatinal otitis, 639

 paracentesis in, 644, 645

 trephination in, 645

Scarlet fever, 815

 synonyms, 815

 etiology, 815

 specific cause, 815

 predisposing cause, 815

 transmission, 815

 portal of entry, 816

 types, 816

 complications, 817

 heart disorders, 216

 hemorrhage, 817

 nephritis, 817

 prophylaxis, 817

 immunization, active, in, 818

 isolation in, 817

 toxoid in, 818

 vaccino-therapy in, 818

 control of epidemics in institutions, 819

 complications of passive immunization, 819

 treatment, 819

 antitoxin in, 819

 isolation in, 820

 serum therapy in, 819

 complications, 820

Sclerosis, multiple, 606

Sepsis in children, anemia in, 54

 Sheet baths, 475

 Shock, surgical, **ephedrine sulphate** in, 472

 pituitary extract in, 472

 Sickel cell anemia in childhood, 57

 diagnosis and symptoms, 57

 Sigmoid, cancer of, **abdomino-perineal excision** in, 279, 280

Silicosis, 563

 etiology, 563

 pathology, 563

 Singers' nodules, **enforced silence** in, 959

 operative treatment in, 959

Sinus disease, 820

 physiology, 820

 bacteriology of nose and throat, 821

 pathology, 821

 complications, 822

 lobar pneumonia, 822

 suction and disinfection of sinuses, 823

 osteomyelitis of skull, 823

 operative treatment in, 823

 treatment, 824

 bacteriophage in, 824

 diathermy in, 825

 diet in, 824

 endocrine therapy in, 824

 frontal sinus operation in, 825

 immunological agents in, 824

 ionization in, 825

 Killian operation in, 825

 physiotherapy in, 824

 radium in eradication of nasal polypi, 825

 supra-rays in, 825

 ultra-rays in, 825

 ultraviolet rays in, 825

 x-rays in, 825

 frontal sinusitis, chronic, 825

 maxillary sinus, 826

 natural orifice of, 826

 treatment, ultraviolet irradiations in, 826

 sinusitis and asthma, 822

 bacterin therapy in, 822

 Caldwell-Luc operation in, 822

 nitrohydrochloric acid in, 822

 tumors, malignant, 826

 diagnosis, 826

 treatment, 827

 plastic surgery in, 827

 radium in, 827

 surgical eradication in, 827

 x-rays in, 827

Sinus thrombosis, 827

- Sinus thrombosis** (*continued*)
 treatment, 827
 of lateral sinus infection, removal
 (prompt) of infected area in, 827
 of otogenous thrombosis of cavernous
 sinus, cigaret drains in, 827
 hydrogen dioxide in, 827
 incision and withdrawal of pus in, 827
- Skin**, allergic diseases of, 27
 explanation of, 381
 differential diagnosis, 27
 treatment, 27
 propeptan therapy in, 27
 cancer of, surgical and radium therapy in,
 200
- Skull**, fractures of, 440
 diagnosis, 441
 injuries of, 435
 osteomyelitis of, 437
- Smallpox** (*variola*), 828
 incidence, 828
 diagnosis, 829
- Smallpox vaccination**, 829
 technic, 829
 complications, postvaccine encephalitis,
 829
 etiology, 830
 prophylaxis, purification of vaccine
 virus in, 831
 treatment, 831
 immune serum in, 831
 test for potency, 832
- Sodium amytal**, 68
 thiocyanate, untoward effects, 874
- Speech development**, retarded, 960
 causes, 960
 treatment, special methods of training in,
 960
- Spinal anesthesia**, 76
 controlled, 84
- Spleen**, 832
 clinical and pathological association with
 liver, 537
 disorders, x-ray diagnosis of, 799
 Gaucher's disease, 833
 rupture of, 3, 833
 blood transfusion in, 3
 iodoform gauze packing in, 3
 splenectomy in, 3, 834
 tuberculosis, 833
- Splenomegaly**, 832
- Splenomyelogenous leukemia**, x-ray diagno-
 sis of, 800
- Stammering**, 959
- Steatorrhea**, idiopathic (*continued*)
 historical, 834
 treatment, 835
 calcium gluconate in, 837
 calcium lactate in, 837
 calcium levulinate in, 837
 diet in, 837
 iron in, 837
 liver in, 837
 marmite in, 837
 ultraviolet irradiation in, 837
 vitamine D in, 837
- Sterilization**, eugenic, 837
- Stomach**, 838
 physiology, 838
 gastric secretion, normal, 838
 effect of neurogenic factors on, 842
- carcinoma**, 850
 diagnosis, 850-851
 prognosis, 851
 surgical treatment, 851
 resection in, 851
- gastric and duodenal ulcers**, 844
 etiology, 844
 symptoms, 845
 complications, 846
 acute hemorrhage, 846
 bed in, 846
 duodenal catheter in stomach in,
 846
 fluids by clysis or vein in, 846
 morphine in, 846
 nothing by mouth in, 846
 transfusion in, 846
- acute perforation**, 846
 gastroenterostomy in, 846, 847
 immediate operation in, 846
 resection in, 847
 suture in, 846, 847
- pyloric obstruction**, benign, 848
 gastroenterostomy in, 848, 849
 injection of jejunal pedicles in, 849
 local anesthesia in, 849
- treatment**, 847
 indications for surgical treatment, 847
 operative treatment, 847
 gastrectomy in, 848
 gastroenterostomy in, 846, 847, 848,
 849
 Judd operation in, 847
 resection in, 847, 848
 transsection of antrum of stomach
 in, 849
 dietetic treatment following gastric
 operations, 849

- Stomach, gastric and duodenal ulcers, dietetic treatment following gastric operations (*continued*)
- diet rich in carbohydrates but deficient in proteins and fats in, 849
 - late symptoms and effects following gastric operations, 850
 - of duodenal ulcers, nonresectable, 849
 - gastroenteroanastomosis in, 849
 - resection for exclusion in, 849
 - of gastrojejunal ulcer, 848
 - diet in, 848
 - gastrectomy, partial, in, 848
 - gastroenterostomy in, 848
 - jejunostomy in, 848
 - resection of stoma in, 848
 - rest treatment in, 848
 - gastroptosis, 843
 - etiology, 843
 - symptoms, 844
 - diagnosis, 844
 - treatment, 844
 - Lambert's operation in, 844
 - hemorrhage, 852
 - etiology, 852
 - diagnosis, 856
 - treatment, 856
 - capsulla bursa-pastoris in, 856
 - ceanothus americanus, liquid extract of, in, 856
 - gastric lavage in, 856
 - normal horse serum in, 856
 - patient's serum in, 856
 - in shock, external heat in, 856
 - morphine in, 856
 - rest in, 856
 - transfusion in, 856
 - in convalescence, alkalis in, 856
 - atropine in, 856
 - calcium gluconate in, 856
 - iron in, 856
 - jejunal tube feeding in, 856
 - liver extract in, 856
 - parathormone in, 856
 - removal of focal infection in, 856
 - rest in, 856
 - sedation in, 856
 - linitis plastica, 852
 - differential diagnosis, 852
 - treatment, gastric resection in, 852
 - volvulus, intermittent, 844
 - diagnosis, 844
- Stomatitis in diagnosis of blood dyscrasias, 173
- Stovarsol, untoward effects, 10
- Strabismus, 856
 - treatment, 856
 - Jameson's recession operation in, 556
- Strychnine poisoning, barbiturates in, 86
- Stuttering, 959
 - mental hygiene in, 960
 - speech training in, 960
- Subumbilical hernia, 464
- Sun bronchitis, 190
- Superficial dehydration, 383
- Sympathectomy and renal disease, 527
- Synesthesia, 630
- Syphilis, 857
 - experimental, 857
 - pathology, 858
 - diagnosis, 858
 - cutaneous manifestations, 862
 - flocculation test, 860
 - Kline finger blood precipitation test, 859
 - Miller's simplified flocculation test, 859
 - Murata's ring test, 860
 - occult syphilis, 858
 - sedimentation reaction, 861
 - serum diagnosis, 861
 - diphtheria serum, 861
 - treatment, 863
 - arsphenamine in, 863
 - bismuth in, 863
 - neoarsphenamine in, 863
 - rat-bite fever in, 863
- cardiovascular, 244
 - aortitis, 244
 - diagnosis, 244
 - myocarditis, 245
 - treatment, 246
 - antisyphilitic treatment in, 246
 - bismarsen in, 248
 - neoarsphenamine in, 248
 - silver arsphenamine in, 248
 - tryparsamide in, 248
- congenital, 867
 - anemia in, 54
 - mode of infection, 867
 - transmission to third generation, 867
 - etiology, 867
 - neurotrophic strain, 867
- seroreactions, 868
 - diabetes, 869
 - epilepsy, 869
 - gumma, 869
- prophylaxis, 870
 - mercury by inunction in, 870

- Syphilis, congenital, prophylaxis** (*continued*)
 neoarsphenamine in, 870
 prenatal antisyphilitic treatment in, 870
 sterilization in, 870
 vasectomy in, 870
treatment, 870
 acetarsone in, 870, 871
 arsenical treatment, complications, 872
 bismarsen, 872
 mercury in, 871
 osarol in, 870
 spirocid in, 870
 stovarsol in, 870, 871
 dosage, 871
 reactions, 872
 sulpharsphenamine in, 872
neurosyphilis, 864
 diagnosis, 864
 treatment, 866
 arsphenamine in, 867
 atropine sulphate in, 866
 bismuth in, 867
 diathermy fever therapy in, 385
 malaria fever therapy in, 867
 serum in, 866
 tryparsamide in, 867
 of eighth nerve, 373
 pregnancy in, 867
 antiluetic treatment in, 868
 syphilitic meningitis, 580
- Tachycardia, paroxysmal, in children, 209**
 Tay-Sachs' disease, 594
- Tension of eyeball, 416**
- Teratoma of epididymis, 873**
 of testes, see Testes, teratoma of
- Testes and epididymis, 873**
 tumors, 873
 treatment, 873
 castration in, 873
 radiation in, 873
 radical surgery in, 873
 x-rays in, 873
 cancer of, 873
 teratoma of, diet, liberal, in, 787
 liver or extract of, in, 787
 radiotherapy in, 786
 radon in, 787
 transfusions of whole blood in, 787
- Tests, kidney function, 512**
 phenolsulphonphthalein test, 512
 liver function, 544
- Tetanus, barbiturates** in, 86
- Tetanus** (*continued*)
 magnesium sulphate in, 86
 morphine in, 86
Tetany, etiology, 303
 in newborn, see Newborn, disorders of
- Thiocyanates, 873**
 physiological action, 873
 untoward effects, 874
- Thromboangitis obliterans, chordotomy** in, 117
 spinal anesthesia in, 83
 sympathectomy in, 115
- Thrombosis, sinus, see Sinus Thrombosis**
- Thymus enlargement in newborn, 621**
- Thyroid heart disease, 248**
 treatment, 256
 ergotamine in, 256
 quinidine in, 256
- Thyrotoxicosis, auricular fibrillation** in, 253
 congestive heart failure in, 253
- Tissues, 680**
 rapid digestion of biological material, 680
 procedure, 682
 demonstration of copper, 682
 determination of arsenic, 682
- Tobacco, effect of, on nursing mother, 477**
- Tongue, tumors of, prognosis, 635**
- Tonsillectomy, 885**
 effectiveness in immunity to diphtheria, 361
 local anesthesia, 885
 epinephrine in, 886
 preliminary morphine in, 885
 procaine hydrochloride in, 886
 complications, 886
 hemorrhage, 886
 prophylaxis, calcium lactate in, 887
 indications 887
 focal infections, 888
 myalgia, 889
 neuralgia, 889
 polyarthritides, acute rheumatic, 889
 secondary chronic, 889
 recurrent exacerbations of marked adenopathy, 888
 recurrent tonsillitis, 887
 rheumatism, chronic infectious, 889
 rheumatoid conditions, 889
- Tonsillitis, 883**
 complications, 883
- Tonsils, 875**
 and focal infection, 877
 bacteriology and epidemiology, 875
 abscess, 885
 treatment, 885

- Tonsils, abscess, treatment (*continued*)
 antistaphylococcus bacteriophage in, 885
 cancer of, 790
 electrocoagulation in, 790
 radium needles in, 790
 radium packs in, 791
 radon tubes in, 791
 pharyngeal diphtheria, malignant, 879
 treatment, 879
 diphtheria serum in, 879
 postanginal sepsis, 880
 treatment, 881
 drainage in, 881
 enucleation of tonsil in, 881
 evacuation of abscess in, 882
 incision in, 881
 ligation of jugular vein in, 882
 tonsillectomy in, 881
 posttonsillitic pyemia, 880
 septicemia, ligation of jugular vein in, 882
 surgical intervention in, 882
 thrombophlebitic sepsis, 880
 enucleation of abscessed tonsil in, 880
 ligation of jugular vein in, 880
 wide opening of connective tissue spaces of throat in, 880
 tonsillar involvement in tuberculosis, 883
 tonsillectomy in, 885
- Toxemias of pregnancy, 765
- Towel baths, 475
- Trachea, tumors of, diagnosis, 396
 treatment, intratracheal electrofulguration in, 396
 x-rays in, 396
- Tracheitis, membranous (nondiphtheritic), 528
- Trachoma, see Conjunctivitis, granular
- Transplantation of ureters, 947
- Traumatic neuroses following head injuries, 436
- Trichiniasis, see Parasites
- Triorthocresyl phosphate paralysis, 508
- Trochlear nerve paralysis, 413
- Tuberculosis of conjunctiva, 287
 of intestines, see Intestines tuberculosis
 of kidney, see Kidney tuberculosis
 of larynx, see Larynx tuberculosis
 of spleen, 833
- Tuberculosis, pulmonary, 890
 etiology, 890
 pathology, 893
 cellular studies, 895
- Tuberculosis, pulmonary, pathology (*continued*)
 chemistry of lipoids, 896
 complications, 897
 abortion, therapeutic, 897
 bronchitis, 900
 diabetes, 900
 gout, 900
 heart displacement, 898
 influenza, 900
 malignancy, 899
 obesity, 900
 pregnancy, 898
 psychic influences, 900
 rheumatism, articular, 898
 syphilis, 900
 undernourishment, 900
 diagnosis, 900
 culture of tubercle bacilli, 676
 stains for tubercle bacillus, 678
 differential diagnosis, 901
 prognosis, 902
 treatment, 903
 altitude, change of, in, 903
 exercise in, 903
 iodine in, 903
 oxygen in, 904
 rest in, 903
 sanatorium treatment in, 903
 surgical treatment, 904
 collapse therapy in, 904
 hydropneumothorax in, 918
 oleothorax in, 919
 indications and contraindications, 919, 928
 testing sensitiveness of pleura as preliminary, 921
 reactions, 922
 technic, gomenol in, 920, 928
 gomenolized oil in, 924, 928
 summary, 928
 compression, in, 924, 928
 fundamental principles of, 928
 indications, 924
 technic, 925
 disinfection, in, 926
 elective, in, 925
 indications, 925
 technic, 925
 gomenolized olive or Wesson oil in, 926
 iodine, tincture of, in, 926
 saline irrigation in, 926
 inhibition, in, 923, 928
 technic, 924

- Tuberculosis, pulmonary, surgical treatment,
inhibition oleothorax technic (*continued*).
 oil replacement in, 924
 phrenic avulsion in, 903, 918, 919,
 929
 phrenic exeresis, 929
 indications, 929
 results, 929
 phrenic neurectomy in, 926
 phrenicectomy, 929
 pneumothorax therapy in, 903-919,
 923
 indications, 907
 complications, 909
 adhesions, 909
 avertin in, 910
 cautery pneumolysis in, 908,
 909, 918
 gas-oxygen in, 910
 hemorrhage from upper respira-
 tory tract, 916
 pleural effusions, 915
 suspended cavity, 912
 phrenicectomy in, 913, 917
 severance of adhesions in,
 912, 913
 thoracoplasty, paravertebral,
 in, 913, 919
 refills, 916
 end-results, 916
 in phrenectomy, 916
 conclusions, 919
 thoracoplasty in, 903, 926
- Tuberculosis, pulmonary, in children, 930
 etiology, 920
 complications, 931
 anemia in, 54
 bronchiectasis, 931
 erythema nodosum, 931
 diagnosis, 931
 bacterial, 935
 benign tuberculous infiltration, 937
 tuberculin, 933
 tuberculous meningitis, 932
 x-rays of chest and Mantoux test, 936
 prognosis, 938
 prophylaxis, 938
 treatment, 939
 methylated antigen in, 940
- Tuberculous meningitis, 580
- Tumors, acoustic, 12
 of acoustic nerve, 374
 of appendix, 101
 of bladder, 167
 treatment, 167
- Tumors (*continued*)
 of bones, 178
 of brain, 179
 of bronchus, 190
 of conjunctiva, 287
 of duodenum, 369
 of ear, 372
 of eye, 413
 of kidney, 523
 of mesentery, 597
 of nasal cavities, endothermy in, 790
 radium in, 790
 of nasopharynx, radium in, 790
 x-rays in, 790
 of omentum, 633
 of oral cavities, endothermy in, 790
 radium in, 790
 of oropharynx, 635
 of ovaries, 650
 of pharynx, 635
 of pituitary gland, 727
 of sinuses, 826
 of testicle, 873
 of tongue, 635
 of trachea, see Trachea, tumors of
 of ureters, 942
- Twilight sleep, 76
 in abstinence manifestations, 76
 in morphine addiction, 76
- Ulcer, corneal, 291
 duodenal, see Stomach, gastric and
 duodenal ulcers
 gastric, see Stomach gastric and duo-
 denal ulcers
 hypopyon, 291
 fistulization in, 291
 iridectomy in, 291
- Ultraviolet rays, 940
 physiological action, 940
 indications, 941
 in diphtheria carriers, 942
 in ozena, 942
 in pharyngitis, chronic and subacute,
 942
 in rhinitis, chronic and hyperesthetic,
 942
 in tonsillitis, acute, 942
 in tuberculous ulcers of pharynx and
 tonsils, 942
 in Vincent's angina, 942
- Ureters, 942
 anomalies, 943
 bilateral double, 516
 obstructions, 943

Ureters, obstructions (*continued*)

- hydronephrosis, plastic operation in, 943
- stones, 946
 - dilating ureteral bougie of sea tangle, 947
 - dilating ureter below stone in, 947
 - prolonged waiting in, 947
 - ureterolithotomy in, 947
- transplantations, 947
 - Peters' operation, 948
- tumors, 942
 - polyp, 942
 - papilloma, 942
- Urinalysis, 686
 - estimation of bilirubin, 686
- Urography, 513
 - neo-iopax in, 513
 - skioldan in, 513
 - uroselectan in, 513
- intravenous, 801
- Urticaria, 948
 - insulin in, 948
 - sodium dehydrocholate in, 948
- Uterus, 948
 - cancer of cervix, 948
 - treatment, 948
 - actual cautery in, 949
 - douches, prophylactic, in, 949
 - hysterectomy in, 794, 795
 - preoperative and postoperative radiation in, 794, 795
 - radium in, 792, 793, 794
 - pyometra following, 795
 - dilatation of cervix in, 796
 - drainage in, 796
 - hysterectomy in, 796
 - serum therapy in, 796
 - in pregnancy, 603
 - radical removal of pregnant uterus in, 603
 - radium in, 603
 - x-ray in, 603
 - of corpus uteri, hysterectomy in, 792
 - radiation in, 792
 - metastases, 793
- cervical fibroids in pregnancy, 603
 - stricture, 949
 - predisposing causes, 949
 - symptoms, 949
 - pathologic changes, 949
 - diagnosis, 949
 - treatment, 949
 - amputation in, 949
 - dilation in, 949
 - vaginal hysterectomy in, 949

Uterus (*continued*)

- chorioepithelioma, 949
 - diagnosis, 950
 - treatment, hysterectomy in, 950
 - x-ray in, 950
- hemorrhage, 950
 - radium in, 950
- sarcoma, 950
 - prognosis, 951
 - treatment, radical extirpation in, 951
 - radiotherapy in, 951
- Uvitis, 951
 - etiology, 951
 - pathology, 952
 - treatment, 952
 - antisyphilitic treatment in, 952
 - autogenous vaccines in, 952
 - removal of foci in, 952
- Uvula, malignant lesions of, electrocoagulation in, 790
 - radium in, 790
 - x-rays in, 790
- Vaccination, smallpox, 829
 - Vaginal enterocele or hernia, 953
 - symptoms, 953
 - diagnosis, 953
 - etiology, 953
 - treatment, 953
 - surgical treatment in, 953
 - operations, local anesthesia in, 72
- Van den Bergh test of liver function, 544
 - in jaundice, 510
- Varicella (chicken-pox), 954
 - complications, 954
 - encephalitis, 954
 - herpes zoster, 954
 - laryngeal stenosis, 955
 - phlyctenules in iris, 955
 - polyneuritis, 955
 - streptococcic infection in nose, throat and mastoid cells, 955
 - treatment and prophylaxis, 956
 - human convalescent serum in, 388, 956
 - immunization in, 956
- Variola, see Smallpox
- Ventricular fibrillation, transient, 219
- Ventriculography in diagnosis of brain tumor, 182
- Verrucae vulgaris, 956
 - bismuth salicylate in, 957
- Vincent's angina, 877
 - symptoms, 877
 - diagnosis, 878

Vincent's angina (*continued*)

- types, ulceronecrotic form of buccal fusospirillosis, 879
- prophylaxis, repair of teeth in, 879
- treatment of primary foci in, 879
- treatment, excision of pseudomembranous formations in, 879
- gargling with boiled water and hydrogen dioxide, 879
- methylthionine chloride in, 879
- neoarsphenamine in, 879
- silver nitrate in, 879
- Plaut-Vincent's infection, 879
- bismuth in, 879
- treatment, 879
 - bismuth in, 878
 - serum in, 878
 - tonsillectomy in, 879
 - ultraviolet rays in, 942

Vioosterol, see Ergosterol, irradiated

Vision, 957

- light sense, illumination, 957
- localization, 957

Vitamine deficiency disease, 301, 302

Voice hygiene, 957

- in chronic hyperemia of larynx, 958
- in chronic inflammation of larynx, 958
- in delayed speech development, 960
 - causes, 960
 - treatment, special methods of training in, 960
- in stammering, 959
- in stuttering, 959
 - mental hygiene in, 959
 - speech training in, 960
- influence of speech defects on learning ability, 960
- relationship of speech and voice therapeutics to operative laryngology, 958
- in idiopathic dumbness, 958
- in paralysis, 959
- in phonasthenia, 959
- in retarded development of speech, 958
- in rhinolalia, 959
- in singers' nodules, 959
- in stammering, 958
- in stuttering, 958

Volvulus, gastric, intermittent, 844

Von Recklinghausen's disease, 176

Wet packs, 475

Whooping cough, 961

diagnosis, 961

Whooping cough (*continued*)

- pathology and complications, 961
- treatment, 962
 - carbon dioxide gas inhalation in, 963
 - fresh air treatment in, 963
 - gold tribromide in, 964
 - human convalescent serum in, 963
 - vaccine therapy in, 962, 963

Winking, 416

Xanthoma multiplex of larynx and trachea, see Larynx xanthoma multiplex

X-rays, 796

- introduction, 796
- in diagnosis, 797
 - angiography, 802
 - methiodol (skiodan) in, 802
 - arteriography, 802
 - sodium iodide in, 802
 - thorotrast in, 802
 - aneurisms, 802
 - breast disorders, 797
 - benign growths, 797
 - carcinoma, 797
 - cysts, 797
 - metastatic involvement, 797
 - fetal death, 798
 - intracranial diseases, 798
 - liver and splenic disorders, 799
 - thorotrast in hepatosplenography, 799
 - abscesses, 800
 - cirrhosis, 800
 - cysts, 800
 - neoplasms, 800
 - splenomyelogenous leukemia, 800
- urology, 801
 - intravenous urography, 801
 - in hydronephrosis, 802
 - in nephrolithiasis, 802
- therapeutic indications, 803
 - in carcinoma of breast, 803
 - metastases, 803
- in dermatology, 804
 - technic, 804
 - untoward effects, 807
 - indications, 807
 - dermatitis herpetiformis, 807
 - eczema, chronic generalized, 807
 - herpes zoster, postoperative neuralgia in, 807
 - lichen planus, 804, 807
 - neurodermatitis, 807

